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CONTENTS.

Editorials:
Notes 227
Wild-Cats 228
Accidents from Overwinding..... 228
The Prospector Again..... 229
Revolutionary Metallurgy 229
Market Conditions 229
Metallics 230
The American Institute of Mining Engineers.... 230
A New Departure in Mining Education..... 230
The Continuous Open-hearth Steel Patent..... 230
Discussion:
Accidents by Overwinding.....*George S. Rice* 231
Pyrite Smelting.....*William A. Heywood and G. F. Beardsley* 231
The Smelting of Sudbury Ores..*A. McCharles* 232
The Prospector Has Not Disappeared *U. S. Rush* 232
A Bureau of Mining.....*F. Linwood Garrison and Arthur Winslow* 233
Investment in Mines.....*W. Burrell* 234
*The Norton Coals of the Big Sandy Basin *H. W. Althouse* 235
The Management of Western Australian Mines *J. H. Curle* 236
Theories of Ore Deposition Historically Considered *S. F. Emmons* 237
*The Geology of the Kolar Gold-field *A. Mervyn Smith* 238
Anthracite Mine Surveying Practice..... 240
*A Trapezoidal Slimes Agitator.*Courtenay De Kalb* 241
*The Edwards Mechanical Ore Roasting Furnace *F. Danvers Power* 242
Tin Production in Bolivia.....*Juan B. Minchin* 244
*The Drillibite 244
Coal Production in Washington..... 245
*The Roll-Jaw Crusher..... 245
Abstracts of Official Reports:
General Chemical Company..... 246
Books Received 246
Books Reviewed 246
Correspondence:
Pyrites Used in Colorado.....*R. B. Hosker* 247
Analysis of Radio-Active Minerals *B. B. Boltwood* 247
*A System for Filing Current Information *George J. Young* 247
Questions and Answers..... 248
Recent Decisions 249
Patents Relating to Mining and Metallurgy:
*United States 249
Great Britain 250

*Illustrated.

DEPARTMENTS.

Assessments 264
Chemicals and Minerals:
New York 262
Foreign 263
Coal Markets:
United States 260
Foreign 261
Dividends 264
Financial Notes:
Gold and Silver Movement..... 263
Prices of Foreign Coins..... 263
Industrial Notes 253
Iron and Steel Markets:
United States 260
Metal Markets:
Silver 263
Copper, Tin, Lead, Spelter and Minor Metals.. 264
Average Monthly Prices Tables..... 264
Mining News:
Summaries: Denver; San Francisco..... 251
Perth, W. A.; San Luis Potosi, Mex.; Sydney, N. S. W.; Toronto, Ont.; Victoria, B. C..... 252
United States 254
Foreign 258
Mining Stocks:
Market Reviews 259
Quotations 265, 266
Obituary 253
Personals 253
Schools, Technical 253
Societies 253
Trade Catalogues 253

EDITORIAL.

THE NEW CURRENCY movements in the East seem likely to reduce considerably the demand for Mexican dollars. The substitution of the peso, coined in the United States Mint, for the Mexican coins in the Philippines, and of the new British, or Straits, dollar in the Malay Peninsula, will make a marked difference in the number of Mexican coins needed for circulation. In fact, the premium on coined silver disappeared some time ago.

Some friction seems to be the result of the introduction of the new silver pieces, both in the Straits Settlements and in the Philippines. The East is conservative and does not take kindly to anything new, least of all to new kinds of money. Government pressure will doubtless be required; but the advantages of the new monetary system will be recognized in time.

THE UNITED STATES Mining Company, of Indiana, Pa., according to papers filed at Dover, Del., is incorporated to mine for all kinds of minerals, including copper, lead, *brass,* etc. Brass is a most useful aid to mining of a certain kind, chiefly the exploitation of the financial resources of simple-minded citizens, but it is not a product of nature; on the contrary, it is a highly artificial substance, the manufacture and use of which indicates an advanced condition of industrial progress. It is considered essential to *fin de siecle* finance. The Mexicans have a proverb saying that it takes a gold mine to work a silver mine; but for certain kinds of mining enterprise three things are necessary, namely, gold, silver and brass, but the greatest of these is brass.

In submitting these ruminations we do not attack the United States Mining Company, of Indiana, Pa., for we know nothing whatever concerning its operations, except that its organizers mistook an alloy for a metal, an artificial compound for a natural product.

THE CONTROVERSY over the price of steel rails will be enlivened by the news that a mill in the United States has taken a contract for 40,000 tons of rails for the Canadian Pacific Railway, for which foreign makers competed. The reported price is $21.25 per ton, delivered at Montreal, which will work out to about $18

per ton at mill. This is $10 per ton less than the price fixed by the rail pool for deliveries in the United States. The mill in question uses pig iron made chiefly from imported ores, and secures a rebate of the duty on those ores when the finished rails are exported. This makes a difference of about $1 a ton on the cost of the rails; but even this consideration will hardly lead railroad managers to regard with equanimity the advantage secured by the foreign line. This is especially the case, as the road in question is a direct competitor for traffic with important railroads in this country.

THE HOLD OF THE syndicates upon the German iron trade seems to be more firmly fixed than ever. Three important pig-iron agreements—the Rhenish-Westphalia, the Lorraine-Luxemburg and the Siegerland—have been renewed for varying terms. These three syndicates have also agreed to co-operate in fixing prices and in determining rebates on export business. The plan for a general steel syndicate, to include all German works, has been revived, and there is said to be a good prospect of its adoption. Some important companies have already promised to join.

AN UNUSUAL use of copper is to be made in the new ferry-house which the Delaware, Lackawanna & Western Railroad Company is building at the foot of West Twenty-third street, in New York. The frame of this building is of steel, and it will be sheathed with copper. As the sheets will necessarily be rather heavy, a considerable quantity of copper will be needed. There are a few copper roofs in New York, but we believe that this will be the first building in the city with outside walls of copper.

The use of copper sheathing, or covering, for the outside of passenger cars, which was first tried on the New York, New Haven & Hartford Railroad, proved successful. Its use for that purpose is being extended, a number of cars recently built being covered in this way.

IN THE PRESENT issue we conclude a series of four articles by Mr. S. F. Emmons, in the course of which that distinguished geologist has presented a historical review of the growth of theories explaining the origin of ore-deposits. This lucid and painstaking summary will have been found most suggestive to those who are interested in a subject whose economic aspect is of quite recent growth. In many of the fanciful notions of the early authorities there is much to remind one of the theories to be heard to-day among working miners and amateur scientists, the elementary conception being much the same in both cases simply for the reason that each starts out with an imagination unhampered by fact and an interest heightened by the striking character of the forms assumed by mineral deposits. The accumulation of observations and the sifting of facts may throw cold water upon the intoxication of theory, but it serves also to brace earnest inquiry and to give strength to the search for truth. This is made apparent by Mr. Emmons' account of the development of the science of ore-deposits, if we can term as 'science' a systematized mass of incomplete information, the teaching of which remains as yet not wholly evident. That it is a study which has elucidated several true explanations of the mode in which ores are formed is apparent from the mere fact that those who have charge of mineral exploration, above-ground and underground, find it a useful guide in their daily work.

WILD-CATS.

We are frequently in receipt of letters from esteemed correspondents, who enclose the circulars or prospectus of some one of the many dishonest mining schemes which are foisted on the unintelligent public by so-called 'fiscal agents.' They ask us to expose these enterprises, but we find it necessary to thank them for their kindly interest and explain to them that we have not ammunition enough to kill these wild-cats; they will thrive so long as men are as greedy to get rich as they are careless of the means by which that consummation is to be reached. The readers of this JOURNAL do not subscribe to such schemes; if they do, they deserve to lose their money, for every issue of ours is a protest against illegitimate mining of all kinds, and contains the names of at least 300 professional men whose occupation it is to give advice on these matters. Advice which costs nothing is worth just what it costs—nothing.

These remarks are prompted by the receipt of a letter from Elk City, Idaho, enclosing a circular which, among other statements, contains such gems as these: "Since the average assays made of ore run $3,000 per ton in gold, and since it will cost us only $1.50 per ton for mining and milling, the profits will be enormous"; or again, "Owing to the unusual rich values of samples of our gold ore, the company will only mail samples, showing visible free-gold, to subscribers for 1,000 shares of treasury stock ($100) or more." The stock is offered at 10 cents, it is to rise to $1 per share within seven months, and the net profits of the mine are to exceed $800,000 per annum. To smite such stupidities as these is to whip a dead dog; people who are waylaid by such statements had better be let alone, for experience only can teach them; advice is wasted.

It amounts to this, that you cannot exterminate wild-cats with a shotgun; they require a lively hunt with dogs. To attack an occasional fakir's scheme serves only to advertise his wares, and it does not protect the only possible victims, namely, simple-minded people who do not read a technical paper such as this JOURNAL. Just as the settlement of the frontier slowly drives the wild-cats into the woods or exterminates those that linger, so an enlightened public opinion will eventually put an end to bogus mining propositions. We are doing our best to create such public opinion.

ACCIDENTS FROM OVERWINDING.

On another page we publish a letter from a colliery engineer drawing attention to the unnecessary character of the fatal accident which recently occurred at Cripple Creek.

On January 26, fourteen men were killed by the overwinding of the engine at the main shaft of the Independence mine. Four days later a coroner's jury brought in a verdict blaming the management for neglecting to take proper precautions; before this jury had handed in its decision, the State Commissioner of Mines announced his intention of calling a board to inquire into the matter, the reason for this unusual action being stated to be "the bias and prejudice existing among the jurors and the law officers having charge of the investigation." This he subsequently withdrew; further proceedings are anticipated. In the evidence before the coroner's jury it came out that the deputy inspector of mines had reported the absence of safety detaching hooks, but no action was taken to insure the addition of such a device until after the accident. It was also shown that the machinery was not working satisfactorily, and that several precautions had been omitted; among these, the placing of the chairs in position is mentioned, but no chairs would have prevented such an accident; on the other hand, the disk brakes appear not to have been in place for action, so that the engineer was unable to use them at the critical moment.

Two lessons are to be derived from this unfortunate occurrence; one relates to safety detachable hooks and the other to mine inspectors. In many mining regions, in Europe especially, the employment of safety detachable hooks to prevent overwinding is made compulsory by law; in the United States this is not usual, for even in Pennsylvania no such ordinance is in existence. Safety clutches, chairs, etc., are useless in the case of overwinding, because the violent impact against the shieve usually smashes the mechanism of the clutch, and the weight of the cage falling fifty feet or more is too much for the chairs to withstand. Therefore, the ordinary precautions are usually insufficient to prevent such a disaster as the one in question, but that a safety detachable hook would have done so is extremely probable. Apart from this lesson, the incident points to the wretched manner in which mine inspection is conducted in Colorado, and

points again to the great injury done to the public service by appointing men to responsible positions mainly on political grounds, and for a short term of office, instead of their being chosen on their merits and kept in office so long as they do their work efficiently.

THE PROSPECTOR AGAIN.

The prospector has *not* disappeared. Not that we really thought he had; at least, in any such complete sense as one can say that the dodo has disappeared, or the mammoth. We thought he was becoming scarce, like the North American bison, for example, or the Australian platypus. Now comes a worthy member of the prospecting fraternity, and by his protest, which we publish on another page, he makes it amply evident that we were mistaken, at least in part. At all events, if our correspondent will pardon the play of words, we need no assurance that U. S. rush has disappeared, for we are daily a witness to it in these dark cañons of New York, where people go prospecting for gold with a restless energy worthy of the men who are the pioneers of mining development.

Joking apart, Mr. Rush need not fear that we misunderstand the type to which he belongs; we yield to none in appreciation of the service done to this country by the capable prospector, for we ourselves have shared coffee and blankets with him in many a mining outpost from the Boundary to the Rio Grande. There is no doubt that Alaska affords to-day the best survival of this class of men; in the older districts, like California and Colorado, the ground has been pretty well examined, and while undoubtedly many districts yet remain to be discovered, even in the States mentioned, the superficial deposits and outcrops of rich ore have been located, and so sequestered from the public domain. In the North, however, there is a vast region, partially explored, but largely untrodden, where the alert and the vigorous find room for the successful work of pioneers. That such work calls forth the highest qualities of an essential manhood, and that, at the best, it is poorly rewarded, we need no current fiction to emphasize, nor do we need the statement of our correspondent. But his presentation of the facts will remind those of our readers who are unacquainted with the conditions under which the Far North is being won to modern industry that the heroic period is not wholly past.

The appeal for mutual respect, as made by our correspondent, is well made, but not necessary—at least to this JOURNAL. A familiar acquaintance and several friendships with the stalwart manhood that has explored unknown mineral regions and opened up the blank places of the map is quite enough, without further knowledge of their actual achievement, to cause us to hold out the hand of good fellowship to the prospectors who form the advance guard in the great army of earnest men who are developing the earth and making it fruitful.

REVOLUTIONARY METALLURGY.

Circulars of a misleading nature are being sent out from London under the heading of Metalia, Ltd., describing a new copper and silver process which is to supersede the present bessemerizing of copper mattes.

This alleged new process for treating complex copper ores is covered by British patent No. 23,848 of 1903, granted to José Baxeres de Alzugaray. The chemistry, as described in the specification, reveals some new reactions that are not generally known, such as the evolution of chlorine from a mixture of sodium chloride, perchloride of iron and hydrochloric acid; the solubility of sulphide of lead in this mixture and the insolubility of zinc sulphide, as described in the treatment for extracting copper first. It is well known that perchloride of iron dissolves chalcopyrite, but so far it has not proved an economical method of extraction; the silver, if acted on by this mixed solution, would be transformed into the chloride and would remain with the gangue, and, as no free chlorine is evolved, the gold would remain with the gangue also; the zinc would be dissolved by the hydrochloric acid or sulphuric acid and go into solution with the copper; the lead, with either acid, would remain with the gangue.

The active agents in this mixture are the perchloride of iron and the hydrochloric acid; as these would be lost in the recovery of the metals from the solutions "in the usual way"—a phrase of large vagueness frequently used in the specification—the expenditure incurred by treating ores in this manner would be prohibitive; the cost, as given, of four shillings for a seven per cent copper ore would not cover the cost of chemicals alone, without considering other charges.

There are other reasons for doubting the soundness of this metallurgical enterprise, but the essential defects in the scientific basis of it should be sufficient to serve as a warning to anyone anticipating a revolution in the reduction of complex copper ores.

THE PRACTICAL establishment of the fact that the Northwest territories of Canada, east of the Rocky Mountains, contain extensive areas of land as well adapted for the cultivation of wheat as those of the Red River valley in Minnesota and Manitoba, is also developing a mining industry in those territories. The country is rapidly filling up with settlers, many of them from the United States, and a demand for fuel has arisen in consequence. Timber is very scarce, but Alberta and Assiniboia possess considerable resources in coal and lignite suitable for local and domestic use and mines are being opened.

MARKET CONDITIONS.

February 10.

The metal markets have been rather quiet during the week, but toward the close showed increased firmness, due to various causes.

While the volume of business actually done in copper has not been large, there has been more inquiry, and consumers at home begin to show a disposition to stock up at the lower prices. Foreign buyers are also showing increased interest in the market, and some orders have been received from abroad, showing that the large business recently done has not fully satisfied demand. The outbreak of war in the East may be expected to cause at least a temporary demand for copper in the manufacture of war material; while exports from Japan may be cut off for the time being.

Tin has been somewhat lower, with moderate fluctuations. Here also the eastern war may have some effect. The recent speculation which carried up the price of the metal, was conducted chiefly by Chinese operators, and they seem for the present to have retired from the market, owing to disturbed conditions in their own country.

Lead is firm at the prices recently established here. Abroad there has been a sharp advance in the metal, which is also owing to the war; but this has not been followed as yet by any advance here, though it is quite possible that one will result.

Spelter is firm and in somewhat better demand. Business, in fact, is very good for this time of year. In the Joplin market prices for ore have been well sustained. There is very little surplus now remaining in the district, the severe weather having stopped work at some mines and restricted production.

Silver is somewhat higher, and demand for the metal seems to be very fair. There have been no more purchases for Indian coinage, but buying for India on private account is good. There has been some demand for Mexican dollars for shipment to China.

The iron markets continue in a somewhat uncertain situation. A little improvement in the call for finished material, especially in bars, is noted. There has also been some demand for structural material, mainly for delivery in the second quarter. There is some speculation as to the probable call for structural shapes, which will result from the Baltimore fire, but this does not seem likely to cause any strong immediate demand. On the other hand, the pig iron market is disturbed and lower prices have again been established. Pig iron of all classes has sold in Pittsburg at some reduction from recent quotations, and there are also rumors of cutting on southern iron. It is also understood that sales of steel billets have been made in a considerable way at $2 or $3 below the pool prices.

The western coal markets have been irregular, owing to severe weather, causing large

domestic demand; to an increased demand for steam coal from mills and factories, and to irregular deliveries and disturbances in transportation resulting from storms and cold weather. Another conference of miners and operators will probably be arranged for shortly, in order to establish the mining rate for the coming year, and it is hoped that this time an agreement may be reached.

The Atlantic seaboard bituminous trade continues quiet, there being little increase in demand, and the movement of coal at shipping and receiving ports being hampered by the weather.

The anthracite trade is active in a retail way, while wholesale buying, though of better volume than it has been, is hardly what might be expected from weather conditions.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

The first copper bars made in Arizona were cast at Clifton in 1873. The ore was taken from the Longfellow mine, near Clifton.

The Governor of the Straits Settlements, Sir Frank Swettenham, states that over 200,000 Chinese entered Singapore last year, and that the colony would be glad to see more; in his opinion, they were honest, hard-working, thrifty, easily governed, and unequaled as a source of revenue.

Osmiridium and platinum have been found in the alluvial gravels of the Horsefly and Bullion districts, in British Columbia. Special appliances are being installed to extract these rare metals.

The Broken Hill Proprietary mine, in New South Wales, is about to manufacture its own sulphuric acid for use in the Delprat process. This will obviate heavy first cost and subsequent freight on this chemical. Broken Hill has become a notable stimulant to metallurgical research.

The Wankie coal-field, in Rhodesia, was long known to explorers and hunters as a black plain, several miles wide, in the heart of the table-land, between Buluwayo and the Zambesi. A large area is covered with fine black dust, due to minutely powdered coal. Wankie is considered the best coal-field in all Africa, but it is still in the very midst of a lion-infested bushland. The development of this fuel supply will mean much to the future of Rhodesia.

The problem how to utilize iron pyrites as a by-product recalls the experiments made some time ago by a certain French company. The residue, mixed with hydraulic lime, was made into briquettes, and by simple exposure to the atmosphere became an ore that yielded pig iron excellent for steel making. The sulphur, it is believed, was completely counteracted by the lime, and there was no phosphorus.

AMERICAN INSTITUTE OF MINING ENGINEERS.

On account of the disastrous fire at Baltimore, the next meeting of the Institute, announced in our last issue as taking place at that city, will be held instead at Atlantic City, beginning on Tuesday evening, February 16. Headquarters will be at the Brighton Hotel. The sessions will be at the Rudolph Hotel.

The plan proposed and organized by Dr. David T. Day, of an ocean excursion of members and friends of the American Institute of Mining Engineers, to sail in a specially chartered steamer at the close of the Baltimore meeting, for a visit to Cuba, Porto Rico, etc., has been necessarily modified because the number of members desiring to take part was not sufficient to warrant the charter of the steamer. It has, therefore, been arranged to secure accommodations for the party on the regular cruise of the tourist steamer *Prinzessin Victoria Luise*, of the Hamburg-American Line, sailing from New York on Tuesday, March 8. The excursion will take 25 days. Members desiring to join in the excursion should communicate with Dr. Day as soon as possible.

A NEW DEPARTURE IN MINING EDUCATION.

An experiment in mining education is to be tried under the joint direction of the School of Mines of Columbia University and the mining departments of the Massachusetts Institute of Technology and the Lawrence and Sheffield Scientific Schools of Harvard and Yale universities. The senior mining students of these four institutions, and possibly of the Colorado State School of Mines, will hold a joint summer session for the study of practical mining and mine engineering in one of the mining districts of Colorado.

The students will go into camp at a mine to be leased for the purpose, a small force of skilled miners will be employed as instructors, and the students will engage in actual mining operations, sinking shafts, driving levels, stoping ore, timbering, and similar practical work, and will make underground surveys, take samples from the ore-bodies, make assay-plans, and undertake other work of an engineering character.

The conduct of the enterprise is to be in the hands of an executive committee consisting of Prof. Henry S. Munroe, of Columbia; Prof. Robert H. Richards, of the Institute of Technology; Mr. John Hays Hammond, representing Yale, and Prof. Henry L. Smyth, of Harvard. Prof. Munroe has been appointed director of the school for the first year, and he will have under him a corps of competent instructors drawn from the several institutions.

Summer schools of this character have long formed an important part of the regular work at the leading mining schools. These sessions have been held in turn in various mining districts and at various mines, where the students have been received by the courtesy of the mine management. It is felt, however, by the professors in charge, that this has become a serious tax on the kindness and good-will of the mining companies, and at the same time it has not been possible, without seriously interfering with the routine work of the mines, to carry out certain details of instruction as fully and completely as might be wished.

The proposed plan of leasing and operating a mine for the instruction of students will largely increase the cost of the summer schools. It is believed, however, that the gain in efficiency will fully warrant the increased expense. Mr. George Crocker has been kind enough to offer to pay the expenses for the coming season, and has placed $12,000 for this purpose in the hands of Mr. Hammond and the presidents of the four institutions named, who will act as trustees of the fund.

THE CONTINUOUS OPEN-HEARTH STEEL PATENT.

In the contest over priority of invention of the continuous open-hearth steel process, the Court of Appeals of the District of Columbia has just rendered a decision, on appeal, which supports the previous award made by the Patent Office. The contest was between Ambrose Monell and Benjamin Talbot, each of whom claimed priority of invention. The court now holds that the evidence fails to show such priority of invention as was claimed by Mr. Talbot, and that the award of the patent to Mr. Monell must be confirmed.

The basal claim on which the patent rests is contained in the following count, which is taken from the specifications of the Monell patent: "1. The method herein described of making steel, which consists in introducing into a basic open-hearth furnace iron oxide and lime and molten pig iron, substantially eliminating phosphorus from the iron while the iron is at a comparatively low temperature; withdrawing at an early stage, in the removal of carbon, the bulk of the slag containing the eliminated phosphorus, and heating the bath of metal and oxidizing the carbon until the carbon has been reduced to a point at which the metal is to be tapped."

Mr. Monell has a patent for the invention, issued to him on June 9, 1900, upon an application filed on March 10, 1900. His preliminary statement alleged conception of the invention by him on January 6, 1900; disclosure of it to others on the same day, and reduction to practice on February 1, 1900.

Mr. Talbot is the junior applicant. He did not file his application until December 6, 1900, which was six months after the issue of the patent to Monell; and he then took the claims and the specifications of Monell's patent and introduced them into his own application. His preliminary statement alleged conception of the issue by him about the year 1888, disclosure to others about the middle of the year 1891, and reduction to practice in January of 1893.

After voluminous testimony taken on both sides, the several tribunals of the Patent Office concurred in awarding judgment of priority of invention to Monell; and from the judgment of the commissioner Talbot appealed. The case was taken to the court mentioned above, which is the special tribunal provided for such cases; and the decision disposes of the interference and establishes the Monell patent.

The litigation in this case has been protracted, and the patent is of considerable importance. Mr. Talbot is now resident in England, and much attention has been paid there to the process. A company has for some time been organized here to develop the Talbot inventions, the controlling interest being held by the Lackawanna Steel Company. Mr. Monell, who was engineer of the Homestead works of the Carnegie Steel Company at the time of his invention, is now president of the Orford Copper Company.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

ACCIDENTS BY OVERWINDING.

The Editor:

Sir.—Noting the terrible disaster at Stratton's Independence mine, at Cripple Creek, Colo., due to the overwind of the hoisting engine, I am impressed with the idea that many mining men cannot be familiar with the means by which accidents of this kind may be prevented. I say this because, a year or two ago, a prominent engineer in Pennsylvania wrote a paper for a certain mining journal, in which he spoke of his having designed several headframes in which the cage could be hoisted clear out of the shaft and over the sheaves in case of an overwind, and soberly mentioned this as a preventative of accidents, such as arise from the cage falling back from the shaft.

Devices with an automatic brake on the hoisting engine are a good feature, but to my mind it is necessary to have a detaching hook, several of which are on the market. My notice was first directed to them some ten years ago, when the Spring Valley Coal Company, of northern Illinois, saved a cage-load of men from dropping down the shaft by having in use such a detaching hook. The company with which I was connected immediately installed them at the neighboring Ladd mine. While lives at this mine were never endangered, to my knowledge, by an overwind, an illustration of the efficiency of the device was demonstrated a year or two after putting it in use. The night engineer, in hoisting out of the shaft, 500 ft. deep, evidently took a momentary nap; the engine was of the first-motion type, which ordinarily hoisted at the rate of from 50 to 60 ft. per second. In this case the speed was such that, after the cage had been detached and hung up in the tower, the rope whipped over backward and cut down through the roof of the frame and corrugated iron engine house, cutting clear to the floor. The engineer narrowly escaped with his life.

Since that occasion I have advocated putting them in at all the mines with which I have been connected. At the Cardiff mine, in Illinois, where the hoisting was very fast, they were frequently called into service. I know of no instance of their failing to act at any of the one-half dozen mines with which I have been connected. After a cage has been detached and hung up, if no damage has been done to the engine, it is a matter of only half an hour to free the cage and start hoisting again. It might be thought that this would lead to carelessness, but I do not think that it does. A good engineer would feel himself more or less disgraced by having it happen at all. If the detaching occurs frequently, the man should be discharged.

The devices are so simple, and relatively inexpensive, that I think there is no excuse for not putting them in at any vertical shaft. I do not hold a brief for any of the patentees who own the several devices now on the market, but I can unhesitatingly recommend the method not only for safety, but as an economy in preventing ordinary wrecks. The detaching hooks I have used are designed for round hoisting ropes. Where flat hoisting ropes are used, as I believe they are at the Stratton mine, it probably would require a special design; but I think there would be no serious difficulty in arranging for it.

GEO. S. RICE.

Chicago, Feb. 2, 1904.

PYRITE SMELTING.

The Editor:

Sir.—As a contribution to the discussion on raw sulphide smelting, I give the results of a series of experiments recently made at the plant of the Tennessee Copper Company, using cold blast. The ore treated is a pyrrhotite mixed with schist containing approximately 2.5 per cent Cu, 40 per cent Fe, 25 per cent S, and 25 per cent insoluble. The furnace used was 56 by 180 in. at the tuyeres and 72 by 180 in. at the top, water jackets 15 ft. high. Air was blown through 28 tuyeres of 4 in. diameter. For supplying the blast a Nordberg cross-compound blowing engine was used, and the quantity of air consumed in each experiment was carefully noted. The experiments were made to determine the results of different volumes of air only. Only the air factor was changed in each experiment; probably by varying other factors more favorable results, especially a higher rate of concentration, may be obtained:

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Tons ore smelted per day	401	228	267	276	468
Tons quartz smelted per day	50	19	22	23	39
Tons other material per day	74	..	..	..	..
Total charge per day	525	247	289	299	507
Tons coke used per day	56	5.7	6.7	6.9	11.7
Per cent coke on charge	10.6	2.3	2.3	2.3	2.3
Per cent coke on ore smelted	13.9	2.5	2.5	2.5	2.5
Per cent copper in matte made	40.0	7.7	11.0	8.4	8.1
Per cent copper in slag made	0.43	0.14	0.11	0.12	0.11
Per cent insol. in slag	32.0	41.0	39.2	39.0	39.0
Per cent FeO in slag	51.0	37.2	40.6	40.0	41.0
Cubic feet free air per minute	16,800	14,400	16,800	19,200	22,080
Height of charge above tuyeres	11 ft.	6.5 ft.	6.5 ft.	6.5 ft.	6.5 ft.

No. 1 is an average daily run, calculated from six months' smelting of heap-roasted ore with quartz, converter slag and some custom matte. Nos. 2, 3, 4 and 5 are the experimental run on raw sulphides with quartz and 2.5 per cent coke. With the exception of the blast, all the conditions were kept as nearly the same as possible. The quantity of ore smelted seems to be in proportion to amount of air blown into the furnace. In these experiments the rate of concentration appears to bear no relation to the rate of smelting.

The low-grade matte made in these experiments was re-smelted with converter slag, quartz and 6 per cent coke on the charge, producing a 40 per cent copper matte, which was converted, and a slag containing 28.4 per cent insoluble, 54 per cent FeO, and 0.46 per cent Cu.

The furnace ran smoothly throughout the experiments. No difficulty or delay was experienced in changing from the usual roasted ore charge to raw ore or vice versa. During experiment No. 5 the slag and matte were so extremely hot that it was apparent that the coke could be either materially reduced or entirely eliminated.

A great deal has been written on the subject of hot blast, but I have never found any definite comparison published on the treatment of any particular sulphides or class of ores by both hot and cold blast. I am sure it would be of great interest if some metallurgist would give the comparative results, both metallurgical and financial, of both methods of smelting; in other words, to add to the volumes that have been written on what *may be* done with hot blast a few words on what *has been* done.

WILLIAM A. HEYWOOD.

Copperhill, Tenn., Jan. 29, 1904.

The Editor:

Sir.—I received your list of questions on my arrival in San Francisco from Tasmania, December 21. Holidays and business have prevented my answering before.

Raw Sulphide Smelting, *Matte* Smelting, *Pyritic* Smelting; I have no wish to quarrel with terms, any of which are not exactly descriptive of the fusion of iron or copper-bearing sulphides by their rapid oxidation in the blast-furnace under suitable conditions; that is, hot blast and small quantities of coke. To the term *pyritic* smelting, however, the above definition has become attached, and, I am afraid, cannot be shifted. I will use it as indicated above. To save repetition I will also use iron "sulphide minerals" as including pyrite, pyrrhotite and chalcopyrite and "pyrite" or "pure pyrite" as a pyritic ore containing 90 per cent $FeS_2 + nCuFeS_2$ with 10 per cent of impurities consisting of silica 3 to 5 per cent, barite 1 to 2 per cent, alumina 2 to 3 per cent, other constituents 0.5 to 1.5 per cent.

1. *What types of ore are suited to the process?*—Pure pyrite and pure pyrrhotite, preeminently. The furnace charge at Mount Lyell averaged 21 per cent silica, 30 per cent iron, 35 per cent sulphur, and 10 per cent of earthy bases, including about 5 per cent alumina. This may be taken as a type, and any composition of ore between this and pure pyrite can be smelted with 3 per cent of coke or less, provided the physical condition of the ore is not against it, that is, fine ore, large lumps of pure silica, or pure schist, or an even blending of the above constituents in the pieces of ore. It is necessary that a certain proportion of the ore be of sufficient purity to start running as a matte at a comparatively low heat in the upper part of the charge. This filtering through the coarse material, oxidizing with the ascending blast, generates heat, at the same time dissolving and fluxing the more infusible portions of the charge. An even blending of 20 per cent silica plus 10 per cent of bases, and equal to about one-third of the bulk or weight of the ore-lumps, will seriously retard this effect.

2. *Is hot blast advisable?*—I think it advisable, and in some cases necessary. It is advisable when the blast can be heated by waste gases. It is necessary where it is desirable to force as much silica into the slag as possible. At Mount Lyell, as the charge column was gradually raised and the blast increased, the stove-heat was taken off, until finally stoves were not used at all. Hot-blast pipe-stoves are certainly a most wasteful apparatus for heating air. From 300° to 500° F. should be picked up from the waste-gases of the furnace with a proper arrangement, especially if there

is sufficient volatilized sulphur to burn above the surface of the furnace charge.

3. *To what extent can fuel be eliminated?*—

Size of Furnace.	Area of Hearth.	2,000 lb. tons of charge per 24 hours. Blast 20 to 30 oz.	Blast 40 to 45 oz.	Tons per sq. ft. of hearth area. 25 to 30 oz.	40 to 45 oz.
126 by 36	31.50 sq. ft.	199.08 tons	284.57 tons	6.31 tons	9.03 tons.
168 by 40	46.16 " "	217.43 "	402.94 "	4.65 "	8.60 "
210 by 42	61.25 " "	271.43 "	530.76 "	4.42 "	8.65 "

This depends upon two conditions; the quantity of iron sulphide minerals in the ore, which are the heat producers, and the relation of those minerals to the gangue. To go back to the approximate furnace-charge analysis under the first question: with a mixture of pyrite and a silicious aluminous schist containing 5 per cent iron, and 4 to 8 per cent copper in the form of bornite, but with the sulphide mineral in concentrated and isolated patches in the gangue, 2.5 to 3 per cent of coke was required, and the campaigns were short. With the same approximate analysis, but with a laminated schist containing 8 per cent of iron and 1.5 per cent of copper, with the sulphide mineral scattered somewhat evenly through it in small grains, practically the same furnace-charge is smelted with 0.3 to 0.4 per cent of coke, and the campaigns last from 60 to 80 days. There is no ore, carrying an appreciable quantity of iron sulphide minerals, upon which some pyritic effect cannot be obtained in the way of reduction of fuel in the smelting.

4. *What amount of copper is required for the collection of the precious metals?*—I note that some metallurgists maintain that copper is not an absolute necessity, and that clean slags can be made with iron matte alone. My own experiences in pyritic smelting have been limited to 1.5 per cent and over of copper in the charge; with the lowest copper I have always had clean slags.

5. *What percentage of lime is necessay to a clean slag?*—The copper matte is the slag cleaner, *not* the lime. Enough lime or bases, including alumina, to make the most liquid slag obtainable, is all that is required. This allows the free settling of the matte particles. With alumina and barite present, I usually aim at a quarter slag containing about 13 per cent of bases other than iron, and vary the lime to suit that requirement. One-fifth slags work well also; but, going below that, the deficiency of the lighter raises the specific gravity of the slag, and is liable to cause a poorer settlement of the fine shots of matte.

6. *What percentage of zinc in the charge can be treated profitably?*—I have had no special experience; but very small amounts in the ores I have been treating. I have noticed, however, on one or two occasions, in the side accretions, more particularly in the furnace corners, small quantities of the zinc-lead sulphide which usually forms the collar accretions in lead furnaces. If there was no lead in a pyritic ore it is possible that some zinc might be carried through, but I believe it would give trouble in the forehearth.

7. *What is the degree of desulphurization attainable?*—I have been in the habit of figuring on the oxidation attainable; one is the converse of the other to a great extent. The degree of oxidation determines the matte-fall. The higher the oxidation, the smaller the matte-fall and the higher the grade of the matte. Oxidizing 80 per cent of the Fe present in 90 per cent pyrite, which is high in practice, will give a desulphurization of 90 per cent, and oxidizing 60 per cent of the iron, which is low, will give an 80 per cent desulphurization.

8. *What are the possibilities as to capacity of furnace?*—The table below gives some dimensions of furnaces:

On a pure pyritic ore, under the most favorable circumstances and with 50 oz. of blast, I have no doubt that the quantities could still be increased by a fifth. The larger furnaces give a smaller hearth-efficiency, but the labor-efficiency is largely increased, that is, the number of men to run the furnace is not increased in proportion to the additional tonnage treated per day.

9. *What are the limitations of the process?*—The answer to this may be deduced from the answer to question No. 3. It is an oxidation process, and naturally shades off from pure pyritic ore, where the oxidation must be the highest, to those oxidized ores that do not require it at all; from those ores of sufficient fuel-value to furnish their own heat for fusion through those that must be assisted by varying quantities of extraneous fuel to those that have to be smelted entirely by it. It may also be limited by excessive quantities of zinc and lead.

10. *What is the relative economy as compared to rival processes?*—It has no rival, where suitable. As against the kiln or heap-roasting, previous to blast-smelting, there is a large saving in the expensive fuel, coke; a complete elimination of the cheaper fuel used for starting the roast-heaps, namely, wood; a saving in the labor of handling the ore to and from the roast-yard; a saving in the interest on a large quantity of dead stock locked up in the roast-heaps, and a great saving in the loss of copper by leaching, especially in wet countries. With 8 to 12 ft. of rain per year, as is the case on the west coast of Tasmania, open roast-heaps are simply out of the question. To cover the heaps required to furnish 1,000 tons of ore per day would mean a heavy first cost and a heavy maintenance cost.

One of the most striking advantages is the rapidity of the work. Eliminating the periods for cooling the matte between the several operations, the actual time from the feeding of the ore into the furnace to the pouring of the blister copper into the moulds from the converter vessels is about 5.5 hours. This includes the smelting of the ore and the production of a first matte of 9 to 15 per cent copper, the resmelting of the first matte, producing converter matte of 40 to 50 per cent copper, and, finally, the melting and blowing the converter matte to blister copper. If converter matte is made direct from mixed ores then the time of treatment is but 3.5 hours. I might here add a note that so far as the furnace manipulation is concerned, pyritic smelting is the most delicate of all blast-furnace work. With little or no coke in the furnace there is no latitude for any application of the remedies common to other work, and although, when absolutely necessary, a sudden shut down of an hour may be made, it will take seven or eight hours to recover from it, and often the foundation is laid for a trouble that does not manifest itself for a day or two. Short campaigns are the rule, and the frequent shutting down of a furnace must be considered as part of the process.

G. F. BEARDSLEY.

San Francisco, Jan. 9, 1904.

THE SMELTING OF SUDBURY ORES.

The Editor:

Sir.—Our friend Sancho Panza says that strange things may happen in the boiling of an egg, and even stranger things may happen in the smelting of ores. A Sudbury correspondent in the JOURNAL of last week says that the same high grade, or 80 per cent, matte that the new smelting plant at Copper Cliff is designed to turn out, has been successfully made for three years at the works of the Mond Nickel Company, down the range, as if it were a new thing in this district. But it is not so, by any means. Fifteen years ago the Vivians, of Swansea, Wales, bought the Murray mine, a few miles west of Sudbury, and afterward sent out an old-fashioned smelting and bessemerising plant from England, to treat the ore. It was very simple, and there was no blowing about it except what was done by the compressor, but from low-grade ore it made 75 to 80 per cent matte; and the slag on the dump of the Murray mine is said to be the cleanest in the whole district yet.

This unpretentious plant also worked all right from the day it was blown in; but though the plant of the Mond Nickel Company was built regardless of expense, various alterations had to be made in it, and two whole months were spent at the start before it could be got to work at all.

These significant facts are well known to everybody here, and they tell their own tale.

A. MCCHARLES.

Sudbury, Ont., Feb. 1, 1904.

THE PROSPECTOR HAS NOT DISAPPEARED.

The Editor:

Sir.—Referring to your editorial of November 7, wherein you speak of the disappearance of the prospector, I claim to be a prospector; and inasmuch as you have the prospector dead and buried, and have pronounced a touching and beautiful benediction over his grave, it is proper that I offer some valid reason for not remaining quiet at this time.

I must plead that the prospector is, or should I say was, a human being and liable to some of the weaknesses of humanity, and because of what has appeared in the ENGINEERING AND MINING JOURNAL concerning him during the last six months, it is perhaps not strange that he should turn in his grave and endeavor to utter a few simple words in his own behalf.

It has been my good fortune not only to be a prospector, but to be with and among prospectors for a considerable number of years, and to know something of their work in Montana, Idaho, Washington, Alaska and various portions of British Columbia, namely, the Kootenai country, the Similkameen river and the Cassiar district.

The popular idea, and more particularly the eastern idea, of the prospector seems to be: First, a person who has not enough ambition to work for a living, so manages to get some credulous person to "put up a grub stake"; and when he has obtained this, he retires into the mountains until it is consumed; then he comes out and "prospects" for another victim. Second, an ignorant half desperado, half dreamer; either a habitual drunkard or at least a most immoderate drinker; one who "knows rock at a glance," etc.; probably has a divining rod, "a secret all his own," and says mysterious things about some place he knows in

the mountains. Third, one who carries a six-shooter in his belt, a dagger in his boot, can make good "gun play," wears a vicious and dangerous expression, is expert in profanity and is a man with a "record."

It affords me much satisfaction to know that people who select such characters to prospect for them usually lose every cent they "put up."

Another popular delusion is that any man at any time may drop his work in civilization, step out into the wilderness, and be at once a full-fledged and proficient prospector. He soon finds, however, that nature demands a tuition fee which must be paid, and in default of which she will send his corpse floating down some mountain river, or leave his bones to bleach in some lonely valley or on some desolate mountain top; or, if in a kindly mood, she may allow him to return to civilization in a few months, minus his outfit, a sadder but wiser man.

Persons unfitted, incapable and undesirable, will attach themselves to any trade, profession or calling, but that is no reason why the term prospector should be a word of reproach, contempt or dishonor any more than those of lawyer or mechanic, doctor or journalist, geologist or mining engineer.

Let us consider for a moment some of the requirements of the prospector; they vary in about every country and every district. In this part of Alaska the prospector should know how to sail and handle a boat; he must pack supplies on his back when ashore; he must be a good woodsman and mountaineer; he must cook and mend and doctor; he must know how and when and where to camp; he must not only have the courage to be at work in the most inclement weather, but he must have the constitution to stand it. He must have patience, perseverance, endurance and faith. If he knows something of surveying and platting it will frequently be a great help, and the more he knows of geology and mineralogy the better. He may have all these advantages and a good outfit and be sober and industrious, yet he will be a failure if he has not "sand," and lots of it. It is the first requirement of the prospector in any country I have seen. When his shoulders are galled and sore from his pack-straps, and his back aches, and he is tired, weak, wet, hungry and footsore, it is "sand" that keeps him going.

In other places he must know how to pack a horse, handle a dog-team, travel on snowshoes, provide for himself on the scorching deserts of the South; in many regions he must handle a boat on swift mountain rivers. In his single-handed fight with Nature she will try him in every way; and with no one to see or applaud, he will dare and do things which, if done in war, would win for him the applause and gratitude of a nation.

As to the results accomplished by prospectors, I will say that within a mile of here a prospector has discovered a large cropping of chalcopyrite on a claim condemned and abandoned by a mining engineer and mine operator. Twelve miles from here two prospectors, one of them a civil engineer, made a geological reconnaissance of a small section of country, platted the notes, and then walked almost directly to one of the largest surface showings of magnetite and copper ore yet discovered on Prince of Wales island. When they had studied the ore-body and formation a few days, to get the strike and possible occurrence of other bodies of that nature in the immediate vicinity, they "happened to stake a claim in that particular place," as sometimes occurs, according to Mr. Keyes, of New Mexico. A portion at least of their ore-body being magnetite, they took a large dip-needle (as sold by Young & Son, Philadelphia), which has a motion in azimuth as well as in altitude, and, by the aid of this and an engineer's transit and field equipment, they made a magnetic survey and platted the magnetic contours. They now have several hundred tons of ore on the dump; have surveyed and are now building a tramway to the property. These prospectors had no capital "behind them," no one "put up," and they were not "grub staked."

I mention these things because, from your editorial and from other expressions in the JOURNAL, I doubt if you gentlemen have any knowledge of the genuine prospector or of his work. Nearly all of the discoveries made in this district have been made by prospectors, and this is true of every mining district of which I have any personal knowledge.

As to there being no more country to prospect, or that the prospector's work is done because, like Alexander, there are no more lands to conquer, it does not seem that this remark could be made seriously. I will only say that there never has been a time when so much new and likely territory has been brought close enough to the lines of transportation to justify the prospector in working it as now. Indeed, if it were as you intimate, then the days of the growth of the mining industry would already be numbered.

You say that "the only prospectors worth mention are the old fellows who sit by campfires and tell of the days when they struck it rich on Bullion hill, or washed the first pan of dirt in Colchis valley." I will not undertake to answer this, but must say, however, that there is something about it that reminds me of a little story I once heard about a fellow called Rip Van Winkle. I have forgotten what the point of the yarn was, but believe he held the record at that time for a long sleep.

I wish, in passing, to mention the geologist and mining engineer in connection with the prospector. On the Finlay river in British Columbia, in 1898, we found that members of the Canadian Geological Survey had preceded us; we were furnished with the map they had prepared; it was of great service, and when that country is near enough to railroad transportation to justify the prospector in exploring it, that survey will be of great value and assistance. Into different parts of Alaska the United States Geological Survey has sent some of their most able men; they have gone in side by side with the prospector, and in many places before him, and the results of their timely labors are now within his reach. There is no need to comment upon the wisdom of the department in this or the splendid results that have been already attained.

The geologist should go first, the prospector should be given his charts, notes and deductions, and follow, not as a spectacular desperado, but as a devoted student of nature. The prospector, in turn, should lead the mining engineer to the very spot where the mineral outcrops, so that he, in turn, by his technical knowledge and experience, may guide capital aright through the difficult process of reclaiming the natural wealth lying idle.

Mr. Keyes, of the New Mexico School of Mines, has told us that "the real honor of discovery" does not belong to the prospector, but to the mining engineer. I cannot agree with this. When the genuine prospector takes his pack on his back, shoulders his pick and faces the trackless wilderness and the elements of nature; when he takes all the risk, financial and physical, and performs all the labor with his own body; when, perhaps, after several years of privation and hardship, during which he has devoted himself zealously to the search for mineral, the day and the hour comes when, far away midst the ringing solitude of the mountains, his food all but gone, his clothes in rags, himself worn and wasted, his is the first eye since the dawn of creation to gaze upon an outcrop where lie millions of idle wealth, is he the "real discoverer"? Is there any question of "real honor"? Who is there, among the thousands that come after, that will labor as he has labored or dare as he has dared? And why, if any one among them knew it was there, did he not go and claim it?

When he has examined his find and "happened to stake a claim in that particular place" (as Mr. Keyes tells us), when he has blazed the trail and prepared the way, he may lead the mining engineer to the spot, if he has the money to hire such service, but in so doing he neither surrenders the honor of discovery nor the rights he has gained thereby.

In the interests of ourselves and our calling, let us cultivate respect, one for the other, unite our forces with fellowship and good will, and march hand-in-hand throughout the length and breadth of the earth, grappling with the mighty mysteries and colossal wealth of nature, not as rival pirates, but as comrades, and by our united brain and brawn, and courage, moral and physical, we will work what would now seem wonderful miracles for the everlasting welfare of all mankind.

U. S. RUSH.

Kasaan, Alaska, Dec. 5, 1903.

BUREAU OF MINING.

The Editor:

Sir.—Your editorial, in the January 14 issue of the JOURNAL, relating to the reorganization of the United States Geological Survey, is a most timely one. I am in entire accord with the views expressed therein. The shortcomings of this excellent governmental department are not so much due to its personnel as to a lack of legislative foresight on the part of Congress. The wonder is, not that its work has at times been open to criticism, but that such excellent results have so often been achieved by the Survey under very discouraging conditions. The present arrangement of departments has undoubtedly led to needless expense, which probably, under the circumstances, cannot be avoided. The Survey has over and over again justified its existence, and has been of immense value to the mining industry, both in this country and abroad. In fact, we Americans have reason to be proud of its work, and of the self-sacrificing spirit that keeps many men on its staff who could easily earn in business or professional life much more than the compensations paid them by the Government.

It is undoubtedly true that its publications are cumbersome, unhandy to mining men and often bury material of the greatest practical value in a vast amount of purely scientific literature. This difficulty is probably recognized by the Director, who, I believe, is taking steps to avoid it as much as possible under the present organization.

The great practical and scientific value of the Survey, even in its present condition, must be recognized by every educated man connected with the mining industry. I sincerely trust your JOURNAL and all mining engineers throughout the country will use their influence in urging Congress to perfect its reorganization and assist by suggestions derived from their own practical experience.

F. LYNWOOD GARRISON.

Philadelphia, Pa., Jan. 2, 1904.

The Editor:

Sir.—I am much interested in the discussion started in your paper concerning the work of the United States Geological Survey and the best means for bringing it into closer touch with mining engineers, and of making it of greatest utility in the development of the mining industry. During the first fourteen years of my professional life I was almost constantly engaged in the work of various geological surveys; during the past nine years my work has been that of a mining engineer almost exclusively. I therefore feel that I am in a position to view the question from both sides. I certainly concur in the idea that a distinct bureau, devoted exclusively to the mining industry, would be a most valuable department of the national Survey. I have always considered that the object of such a survey was primarily the development of the mineral industry, and that the mining interests should be given greatest prominence. The organization of a survey should be in harmony with this idea. Its resources and its activities should be principally applied to this end. The work of the national Survey undoubtedly covers this field to a large extent at present, but there are other subjects which are given more attention and to which larger appropriations are applied, and the mining feature is not so prominent in the organization as seems called for. Such a bureau could do much toward bringing to direct bearing upon the mining industry many of the results of scientific research, which seem to the layman to have only a very remote connection. There is much of such information gathered and published by both national and State surveys, which, properly utilized, is of great value to the mining engineer. Many, and probably most, of such engineers are not in possession of this information, and many hardly know of its existence, or of the importance of the conclusions and deductions. This condition is attributable to several different causes.

Mining engineers are, as a rule, very busy men, absorbed in the details of their special business, and with little time to read reports, often voluminous, which seem to have only a remote theoretical connection with their work. Many are in distant localities, inaccessible to libraries, and may not know enough of the contents and nature of such publications to be sufficiently interested even to apply for them. Such a bureau, once established, would give prominence to the mining work of the Survey, and could give special attention to telling the mining engineer what has been done by the Survey, and what information is available; that information could be so placed and distributed as to be most accessible at all times. Mining engineers are migratory people, and they generally have to travel light and on short notice. Little of their time is spent in cities where reference libraries are accessible. Even resident engineers are seldom so permanently established that they feel like assembling a working library. When engaged in examination work an engineer may start from headquarters on telegraphic notice with no time for consulting references, and he may arrive in a new field with absolutely no knowledge of what geological reports have been published concerning that locality. To make such information more available when most needed, to lead mining engineers into the habit of utilizing all of the accumulated data to the fullest possible extent, and to bring them into greatest appreciation of the work of the Geological Survey, would it not be practicable for the national Survey, in conjunction with the State organization, when such exists, to establish in the principal mining camps, and especially in remote localities, a bureau or agency where all publications, including monographs, bulletins, folios and maps particularly relating to that locality could be assembled and exhibited? Such an agency need not be elaborate. Some correspondent of sufficient responsibility to take charge of publications could be found in almost every camp, and some nominal compensation would suffice to pay for the trouble of custody and of guidance to visitors. If, as an adjunct, occasional lectures or "smoke talks" on survey work could be given by a member of the Survey, relating particularly to results in the neighborhood, such would be of mutual benefit, and would be attended with interest.

It may be answered that education and the dissemination of knowledge are not exactly the functions of a survey, but are the work of schools and colleges. This, to a certain extent, is true, but if such work would tend to increase the usefulness of the Survey, there is certainly no one to object to this special course of instruction, and there are many people who may not have had the advantage of college education, or who may be at the disadvantage of having attended college many years before, who would profit by it. The general application of the idea may be impracticable, and such an agency may not be perfectly conducted or fulfill its greatest possible usefulness in any one instance, but it seems to me that something of this kind might be maintained in some localities to great advantage. At least, is the idea not worth an experiment?

ARTHUR WINSLOW.

Boston, Jan. 25, 1904.

INVESTMENT IN MINES.

The Editor:

Sir.—I have read, with much interest, your remarks under this heading in your issue of October 3 and previous number.

I agree entirely with your views, and it is a matter of regret that Mr. J. H. Curle should throw his undoubted influence with those who are "booming" certain gold mines at the expense of the interests of mining generally.

While admiring much of Mr. Curle's work in the past, he is going very much too far in saying that an investment gold mine should only return 10 per cent. Your view that rather 20 or 25 per cent should be looked for is much more reasonable. I incline myself even further, and believe that the old and tried rule of gold mining townships—where the shareholders are all local men who are well acquainted with the developments and prospects of each mine—of fixing the market valuation of shares at equivalent to three years' dividends, is a safe guide in most instances. Of course, in some cases, allowance should be made where great prospects of increased dividends or important developments are probable, and even a much greater value is allowable in the case of such mines as those at Kalgoorlie, where great possibilities undoubtedly exist.

Take the case of the Great Fingall mine; some years ago, when the shares were only a fraction of the present price, Mr. Curle rightly recommended it as an investment. The present position of this mine is approximately as follows: Market valuation 250,000 shares, at £9 7s. 6d., is £2,281,750; ore-reserves show a profit in sight of about £1,500,000; and yet at this moment Mr. Curle is recommending this as an investment at £9 7s. 6d. per share.

All who desire to see the mining industry attractive to the general public should deprecate his arguments as tending to eventually land the investor with shares at inflated prices, and I think that the thanks of the mining community are due to the ENGINEERING AND MINING JOURNAL for its consistent and fearless views on all matters affecting the industry.

W. BURRELL.

Perth, W. A., Nov. 16, 1903.

[While appreciating Mr. Burrell's compliment and the good sense of his remarks, as given above, we would suggest to readers that it is likely Mr. Curle will, when heard from, put a different aspect on the matter over which he is criticised. He has two qualities which have given him a position of enviable distinction; he is fearless and he is honest. Mining would be cleaner and more profitable if there were more such men.—EDITOR.]

NEW COAL MINES IN ENGLAND.—The London *Colliery Guardian* says: "In the hope that the coal, of which there is evidence in the neighborhood of Bentham and Ingleton, on the northern borders of Lancashire and Yorkshire, may prove of commercial value, a syndicate, it is stated, has acquired the mineral rights of the manor of Ingleton, and bore-holes are being sunk. The manor covers an area of 15,000 acres between Ingleton and Bentham Moor."

RADIUM.—According to Prof. A. H. Phillips, radium has been found in and extracted from carnotite from Utah, and arrangements have been made to produce radio-active salts from it at Niagara Falls. A very interesting fact is the discovery of radium, or at least a radio-active effect, in the spring water at Bath, England, the flow of which is estimated to amount to 1,000,000 tons per annum. Similar discoveries are reported from other mineral springs, but they are not so well authenticated.

PORTAGE LAKE SHIP CANAL.—The report of the engineer in charge of this canal, which is a cut-off across the Keweenaw peninsula on Lake Superior, shows that in 1903 there were 4,434 vessels passed through the canal, carrying 2,420,948 tons of freight. This is a decrease of 131,375 tons, as compared with 1902. The tonnage in 1903 included the following mineral freights: Coal, 153,587 tons; iron ore, 164,348 tons; pig and manufactured iron, 27,773 tons; copper, 87,657 tons; limestone, 38,080 tons; building stone, 23,294 tons; sand, 12,520 cu. yd.; salt, 201,563 barrels.

THE NORTON COALS OF THE BIG SANDY BASIN.

By H. W. Althouse.

Northward from the Norfolk & Western railroad along the Clinch river, in Russell county, southwestern Virginia; beyond this, along the slope of Sandy ridge, on the upper waters of Dump and Hurricane creeks; and still farther northward, along the other slope of the ridge, and on the waters of the Levisa and Russell forks, toward their junction with the Big Sandy river, there exists a large undeveloped coal-field in Pike county, Kentucky, and Russell, Dickenson and Buchanan counties, Virginia. This portion of the great coal basin contains about 250,000 acres, mostly underlaid with the coals of the Norton formation, above the Pocahontas group, measures of the Pottsville series.

Southward, from near the Kentucky boundary line, this region is devoid of railroads, the only communication being over rough trails, still rougher roads, the river channels and creek bottoms. Throughout the area embraced, about 30 miles long by 18 miles broad, the travel by horse is not disagreeable, although dismounting and packing must at times be resorted to in order to pass under fallen timber, which, with other inconveniences met with in a sparsely settled country, had to be cheerfully borne in making an examination of the coals in this region.

The topography of the country shows a plateau deeply eroded by numerous water courses, which lie nearly 1,100 ft. below the higher levels. The greatest elevation observed by the aneroid was 3,100 ft., on top of the Sandy ridge, or about 1,600 ft. above the river at "The Breaks," near the Kentucky line.

Along most of the creeks, higher elevations extend from the Levisa and Sandy ridges, the tops of which, at places, are acute, thus showing a country of ravines. Therefore, the several coal-beds of the upper group, outcropping at higher altitudes, will have decreased areas, as shown on the accompanying field sketch, which is the prevailing condition over the area examined. Geologically, the coal lies above the Seral conglomerate of the Pottsville No. XII, locally known as the Lee conglomerate. These coal measures, nearly 1,250 ft. thick, are below the Gladeville sandstone.

The upper conglomerate of the Lee group was first observed on Dump creek, under the lowest coal or Jawbone bed, which underlies practically the entire country. It forms the base section and the determining feature of the workable coal area, as it is the lowest of the Norton group of coals, which measures contain six distinct beds. Likewise, the Gladeville sandstone, about 1,100 ft. higher up in the series, more particularly marks the areal limit of the productive group. Only along the highest elevations was this sandstone observed. Beneath it, at an interval of 130 ft. of shale, appears the Edwards bed, the uppermost coal. Lower down, between the two coal-beds mentioned, there appear, at their proper horizons, four other coal-beds.

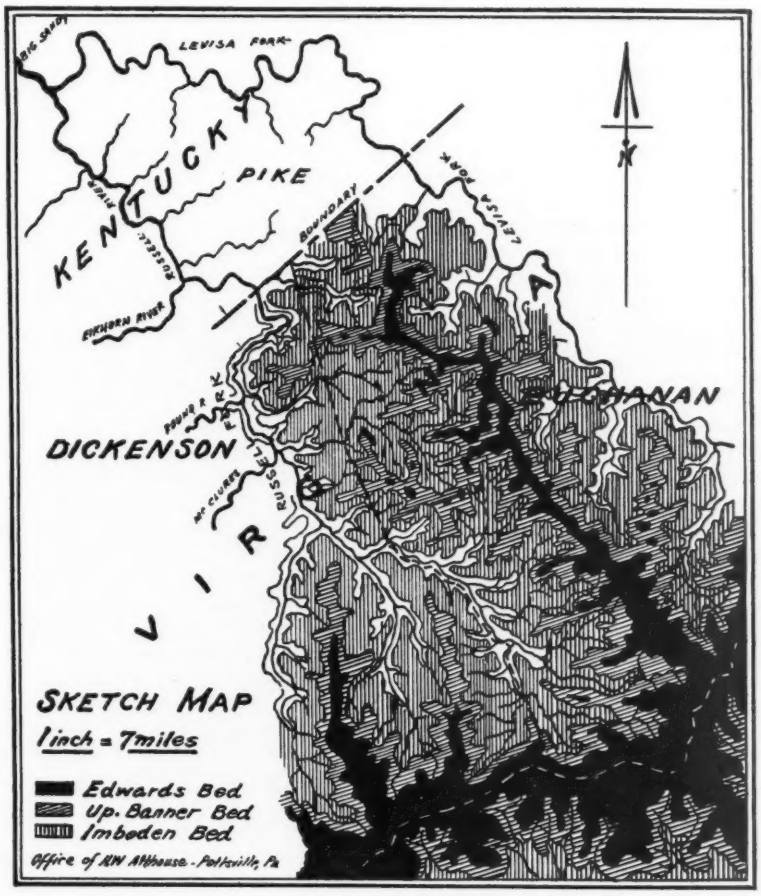
At various localities in the Gladeville sandstone there is conglomerate; a condition, however, which did not show over any great area, as generally it appeared a coarse, massive sandstone. This has probably prevented the erosion of the upper group of coals. Its dip was found to be toward the northwest, though along some of the more important watercourses opposite dips were observed. For purposes of generalization, the coal series below this stratum of sandstone is divided into two groups, the upper and the lower, separated by about 250 ft., giving three coals to each member, as shown approximately in the columnar section.

Several well-defined local coal basins were noticed in part of the region, particularly toward the northwest. The extent of these basins westward was not determined, but, where conspicuously noticeable, the lower coals were carried under the several rivers, only to reappear and form distinct basins. Elsewhere, throughout the region, the strata were mostly found to be horizontal.

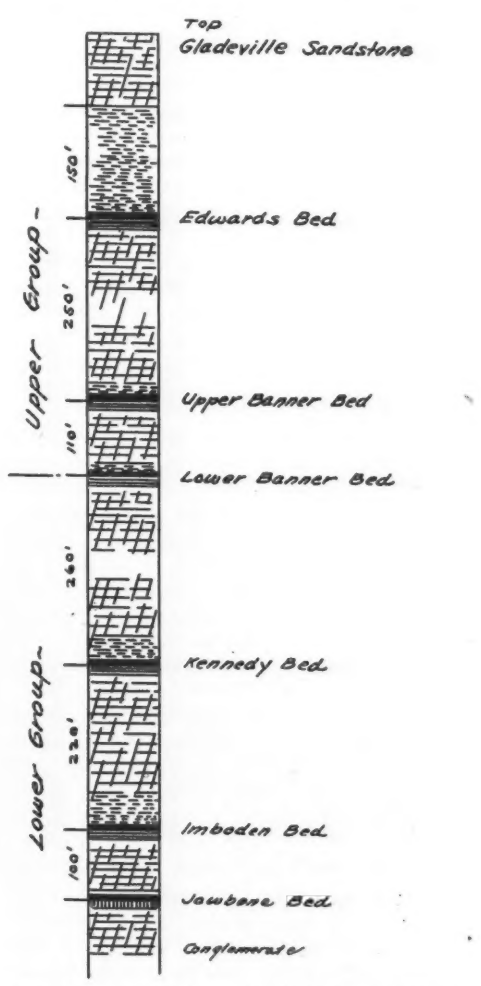
Westward from the area shown, at certain localities, there appeared a dislocation of the strata on a downthrow fault. At other points there exists, as already mentioned, a local folding of the strata; and, on account of the few coal prospects made, it was found necessary to systematically open the various coal-beds, in order to determine more particularly the structure and integrity of the bed-section for comparative purposes.

In passing northward, the entire geological scale of the Norton formation was ascended and descended in regular order. The series comprises six beds, the horizons of which were frequently observed at many points toward the Kentucky side. The coals, in ascending order, are known as the Jawbone, Imboden, Kennedy, Lower Banner, Upper Banner and Edwards beds.

The lowest bed, the Jawbone seam, showed about four feet of clean coal at the base of



THE NORTON COALS OF THE BIG SANDY FORMATION.



COLUMNAR SECTION, NORTON FORMATION.

Sandy ridge and near "The Breaks," but is of variable thickness and somewhat irregular in dip, having a sandstone top and fire-clay bottom.

At from 90 ft. to 110 ft. above the Jawbone bed, up Hurricane creek, the Imboden coal was examined at various places, showing a section ranging from 6 to 8 ft. thick, and containing in the middle of the bed a seam of dull coal, somewhat inferior in quality.

Along the southern slope of Sandy ridge, on the Indian creek waters, the Banner and Kennedy seams were found to vary from 5 to 6 ft. in thickness, the Upper Banner bed showing much top-shale above the regular section of coal, while the Kennedy bed has slate partings.

The Kennedy seam, about 220 ft. above the Imboden bed, and 260 ft. beneath the Lower Banner coal, was invariably found laminated with shale, showing it a bed of uncertain commercial importance, where observed in the upper reaches of some tributaries of Indian creek.

Edwards Bed.—In passing to the watershed of the Levisa and Russell rivers, the Edwards bed was found near the top of the higher elevations, lying under a massive shale below the Gladeville sandstone. This coal is an attractive seam, but being confined to the tops of the general plateau, it is of limited area. At places it shows 5.5 ft. of clean coal, with a cover as thick as 250 ft. This bed, wherever recorded, appears to be persistent and uniform in thickness, clean, and of good quality.

Upper Banner Bed.—This seam, 250 ft. below the Edwards bed, was found in good condition; it carries a small parting of slate or shale near the middle, but the quality of the coal is excellent, and the thickness from 3.5 ft. to 6 ft. Usually it has a shale top and a slate bottom.

Lower Banner Bed.—This bed was examined at many places. It is small, compared with the Upper Banner coal. The thickness is variable, but the quality of the coal is good. This seam is the lowest member of the upper group.

Kennedy Bed.—This is 260 ft. beneath the Lower Banner seam. The vein section often shows many partings of slate, and therefore is rarely found commercially workable, but the seam requires much more prospecting before its true condition can be ascertained. It covers a wide area, and is the uppermost bed of the lower group of coals.

Imboden Bed.—Along the more important rivers and creeks, this bed, 220 ft. under the Kennedy seam, showed mostly good sections, ranging from 5 to 6 ft. thick. Several small lenses of carbonaceous matter were seen, but the quality of the coal was not impaired. This bed compares favorably with the Edwards and Upper Banner seams, and is an important coal, covering a much larger expanse of country. The seam is attractive, and is a coking coal. The top is shaley.

Jawbone Bed.—This, the lowest coal in the Norton formation, appears about 90 ft. beneath the Imboden coal. It was found as much as 5 ft. thick, but varies. The bed covers almost the entire region, is workable, and of good structure.

The coking and steaming qualities of the more important seams, the Edwards, Upper Banner, Imboden and Jawbone beds, is unquestionable wherever examined. Mining development in this field would not present any serious problems, as the coal lies above water-level, and mostly in horizontal measures. But, as the entire country is greatly eroded, the coal-beds lower than the Edwards would show rapidly increasing areas with reference to their position in the geologic scale.

THE MANAGEMENT OF WEST AUSTRALIAN MINES.*

By J. H. CURLE.

As I have often said before, a capable and straightforward manager is worth more to a mine than all its directors put together, and it is more important that the managers of the big West Australian mines should be capable men than that the directors should be. It is, therefore, with pleasure I record the fact that the managers of the principal mines to-day are mostly men of high standing, that they are efficient from a technical point of view, and are usually, if my judgment is not at fault, men of honor. I consider the standard of mine management in this State is now as good as, or better than, on any other gold-field I know. It is immeasurably ahead of the crude methods of the other Australian States; it is better than India; it is, at least, as good as on the Rand; and probably ranks with the best-managed American mines. I speak mainly of the bigger mines, of course. Not that the smaller ones have necessarily inferior managers, but working, as they do, on a small scale, they are not able to show results on which to base comparisons. In these bigger mines, costs are still coming down. The tendency of all these mines is to increase their output. This, of course, brings down working costs automatically; but, independent of that, a lot of clever brains are at work, and the spirit of emulation now existing on the field is a good sign. In some of the mines the lowering of expenses in the last 12 months has been quite sensational.

I think my series of articles must have made it clear that the gold-mining industry of this State is a sound one, with a big future before it. All the best mines, moreover, now belong to English shareholders, and they represent a great and growing asset. These mines are centred in London, under the control of a relatively small group of directors, and I propose to discuss in the present article in what manner of way these men carry out the duties entrusted to them.

I am not going to give way to pessimism in this matter, by pointing out all the scandals and intrigues these mines have passed through, because I know the state of affairs to be steadily improving, and ever so much better than it was a year or two ago. The standard of efficiency of these men, collectively, has improved. It has not risen so fast as has the standard of efficient management at the mines; but, nevertheless, there is an improvement. Of course, from the point of view of the small shareholder, you will never have ideal directors. On nearly every mine there is some one director who has a big stake in that mine. That director—a wealthy man—does not sit on the board, and probably do all the hard work of dictating the mine's policy, for £200 a year. He is there, without making any secret about it, to get all the information he can, and if, at any time, such information clashes with his duties to the smaller holders, they are liable to be sacrificed. I do not seek to justify this. But how is it to be avoided? If the small shareholder who denounces such conduct were himself to hear bad news about the mine from a private source, he would at once sell out without scruple. Does he suggest that a different code of ethics should guide the big shareholder merely because he happens to be a director, though he may fairly argue that he does not, like the director, occupy a position of trust? Personally, I think a director should be guided by a strict code of duty; but I admit that this question is a complex one, and cannot be solved off-hand. I suppose the ideal director would be one who held no shares in the mine. Failing that, a board of those men holding very few shares, well paid, and each efficient in his duties, is the ideal board. However, to return to the main subject, I believe the leading mines have mostly passed from a period of directorial incapacity, coupled in a good many cases with discreditable intrigues, to a condition which shows some capacity and a great deal less intrigue. I don't say the directors have all suddenly reformed, and are leading blameless careers; but there comes a time in the history of any good mining field when those in control find it more profitable to run the mines efficiently, because they are great and valuable mines, and will produce immense profits; and this is what has happened, to a certain extent, in West Australia. But there have been other good influences at work, more especially the improvement in the character of the mine managers, to which I have already referred. Further, on the boards of several of the big mines there are now technical men—mining engineers—who add strength to these boards. I think there should be a mining engineer on the board of every big mine. From his business, such a man is bound to have an adequate knowledge of finance, while his technical knowledge must always be of infinite valuc to a group of laymen.

*Abstracted from the London *Economist* of January 23, 1904.

THE WILFLEY ELEVATOR.

Arthur R. Wilfley, of Denver, Colorado, the well-known inventor of the concentrating table which bears his name, has lately patented a new form of belt elevator (United States Patent 748,551, December 29, 1903). In this elevator the buckets are fixed to horizontal bars, which are carried by link-belt chains, passing over sprocket-wheels at the head and foot of the elevator. The sprockets and chains are arranged to run outside of the elevator housing, the cross-bars which carry the buckets passing through slots in the housing. In this way lateral play and vibration of the elevator are effectively prevented, and, moreover, the chains are kept out of the water and pulp and are situated in a place where they may be looked after and kept oiled at all times with the least possible interruption or inconvenience. The cross-bars have an offset in the center, where the bucket is bolted on, so that in the boot of the elevator the bucket will dip deeper than the lowest point of the slot, whereby water is prevented from running out of the slot. The sprockets at the head of the elevator are made larger than those at the foot, and, after passing over the head sprockets, the chain is deflected inward by a small sprocket, like a knuckle-wheel, so as to insure a good discharge from the elevator.

THEORIES OF ORE DEPOSITION HISTORICALLY CONSIDERED.*

BY S. F. EMMONS.

(*Continued from page 200.*)

The idea that later-formed ore-deposits are necessarily the filling of considerable cavities or open spaces in the enclosing rocks has been considerably modified by the important rôle that the process of metasomatic replacement or substitution has been shown to have played in the formation of ore-bodies. The idea of replacement had been suggested in the conversion theories of the early speculators and more distinctly expressed by Charpentier. By the geologists of the second period it was comparatively neglected, though in a few cases admitted as a subordinate factor, especially in the formation of deposits in limestone. Even in Posepny's frequently quoted studies of the lead and zinc deposits of Raibl, in Carinthia (1873), he admits this mode of formation only for the oxidized ores, considering the sulphide ores to have been deposited in open cavities.

In America, Pumpelly first applied this process to the copper deposits of the Lake Superior region (1871), of which he says: "In at least very many instances, if not in all, the deposition of the copper is the result of a process of displacement of pre-existing minerals." Leadville and Eureka were the first large mining districts in which it was proved that extensive ore-deposits were entirely formed by metasomatic replacement of the enclosing rock, which in these cases was limestone. Later observations showed that this form of deposit was not confined to limestones, and that in fissure-vein deposits, even in acid rocks, metasomatic processes had often played an important part in replacing with ore portions of the country rock which, under the old views, might have been regarded as vein-filling. The interest and importance of this view was speedily recognized, especially by American geologists and mining engineers, and, while still novel, it was doubtless sometimes applied, without sufficient proof, as an explanation of the formation of certain vein-deposits, to the exclusion of that of the filling of cavities or interstitial spaces. With the general introduction of the microscope into the study of vein-materials, however, a comparatively sure method was provided of distinguishing the results of the two processes. The process of verification has in this case resulted in the establishment of the importance and increasingly wide applicability of the metasomatic theory to the formation of ore-deposits of all types.

In the latter part of the decade, Irving and Van Hise's studies of the iron deposits of the Lake Superior region had demonstrated that they were deposited from solution in descending or meteoric waters, whose downward course had been arrested by some impervious basement—sometimes a dike, sometimes a bed in a synclinal basin—and that during this time of stagnation their load of iron oxide had been laid down as a metasomatic replacement of the enclosing rock—a descensionist theory, but of essentially modern type.

In 1893 appeared the well-known paper on 'The Genesis of Ore-Deposits' by Posepny, for ten years professor of this branch of the science at the School of Mines in Przibram, Bohemia. Although Posepny's views were by no means universally accepted by geologists, especially in America, all agreed that his work constituted a most valuable contribution to the science, by its clear definitions of the questions involved and their masterly scientific discussion. The great majority of ore-deposits Posepny considered to be of later origin than the enclosing rocks, even those that are found in stratified rocks in apparent conformity with the bedding; further, that they have been deposited by precipitation from waters of the deep circulation below the groundwater level. The groundwater, he conceived, descends by capillarity, through rock interstices over large areas, to rise again, at a few points, through open channels, under the influence of heat. It derives its mineral matter from the 'barysphere' or deep region, where the rocks are richer in metallic minerals than near the surface, and subsequently deposits them in open spaces as it ascends. These spaces are either spaces of discission (rock-fractures) or spaces of solution, the latter sometimes being formed by ascending thermal waters, even where no previous crack exists.

Fresh as he was from his controversy with Sandberger over the lateral secretion theory, which he had disproved, at least in its application to the Przibram deposits, he was inclined to view with disfavor anything that flavored of lateral secretion; hence, while admitting that the presence of minute quantities of the metals in eruptive rocks leads to the surmise that they had brought the whole series of heavy metals up from the barysphere into the lithosphere or upper crust, he preferred to assume, in the cases which the American geologists had explained as derivation from eruptive rocks in the vicinity of the deposits, that the mineral contents had been brought up by thermal waters directly from the barysphere. Likewise, in the limestone deposits, which their studies show to have been formed by metasomatic replacement, he thought that they must have overlooked some evidence of crustification, and still held to the opinion that such extensive deposits must be mainly the filling of open spaces. Although not explicitly stated, it is evident that he regarded the water of his deep circulation as mainly of meteoric origin.

Of great practical value was the clear idea conveyed to the mind of his readers of the distinction between the oxidized or altered minerals and the original or sulphide minerals of an ore-deposit, a distinction that had already been pointed out, though less emphatically, by Emmons (Colorado Scientific Society, Vol. II, Pt. 2, p. 99, 1886), and others.

In the same year appeared the first of a series of important articles on the formation of ore-deposits by the Norwegian geologist, J. H. L. Vogt, in which, as opposed to Posepny's views, so much more importance is given to igneous agencies that their different standpoints recall the antagonisms of the old Neptunist and Plutonic schools. The petrographic studies of Vogt and Brögger had disclosed in basic dikes a tendency of the heavier minerals to concentrate near the borders. Following out the suggestion offered by this observation, Vogt had proved by field study that certain titaniferous iron ores were actual segregations in the eruptive magma previous to its final consolidation. Based on petrographic studies made by Brögger and himself, and personal observations on ore-deposits, principally in Norway, Vogt defined two methods of formation of ore-deposits as the direct result of igneous action:

(1) By magmatic segregation, and

(2) By eruptive after-action or pneumatolysis (a term first used by Bunsen to describe the combined action of gases and water).

In the first class (of admittedly infrequent occurrence) are titaniferous iron ores, chromite, and other metallic segregations in basic eruptive rocks, which are allied to meteorites in composition. In the second class, commencing with tin and apatite veins, he included, as time went on, increasingly numerous types of deposits. This was in one sense a revival of de Beaumont's theories, but the modern standpoint differed, in that the existence of a liquid molten interior of the earth had been disproved by terrestrial physicists. Vogt held that, as no communication could be established between ore-deposits and a heavy interior, they must have been derived from a crust, say ten, twenty-five or fifty kilometers in thickness, and in great measure the result of eruptive processes within that crust.

Emmons (in 1893) acknowledged the importance of the finding of magmatic concentrations of metals in eruptive rock, but thought that in most cases such accumulation must have been further concentrated in order to produce economically valuable ore-deposits.

During the succeeding decade, the influence of Posepny's paper was felt in an increased adherence among outside geologists and mining engineers to the ascension theory. Vogt's views received less attention in this country, because for a long time no ore-deposits were studied to which they were found to be applicable; the first case was that of the titaniferous magnetites of the Adirondacks studied by Kemp, the results of which were published in 1898.

The year 1900 was rendered important in the progress of theoretical views on ore deposition by the simultaneous appearance of the article by Van Hise on 'Principles Controlling Deposition of Ores,' of those by Emmons and Weed on 'Secondary Enrichment,' and by Lindgren on 'Metasomatic Processes,' and by the discussions which they prompted. Van Hise's article was a broad philosophical treatment, based on experimental data, of the whole question of underground circulation as bearing upon ore deposition. It would be impracticable to give here any complete abstract of his paper, which is probably familiar to most of you, and only a brief statement of such points as bear upon the general processes heretofore alluded to will be attempted. His discussion is practically confined to ore-bodies deposited from aqueous solutions, which he considers to embrace the larger proportion of workable deposits, and he holds that the waters from which these deposits have been made are mainly of meteoric origin. Their circulation is in part descending, in part lateral moving, and in part ascending, and during each of these movements they may take up or deposit metallic minerals according as conditions favor either action. This circulation takes place in openings in rocks, mostly produced by fracture, and hence is confined to the outer portion of the crust, which he has defined as a zone of fracture as distinguished from a deeper zone, that of flowage, where, under accumulated pressure, deformation produces no macroscopic openings. Its general tendency is to concentrate from the small openings into larger or trunk channels. The

*Presidential address before the Geological Society of America, at St. Louis, December 30, 1903.

deposits from these waters are distinguished as concentrations: (1) from ascending waters alone; (2) from descending waters alone; (3) first from ascending, and second from descending waters.

In prevailing composition the first class are sulphides, tellurides, etc.; the second, oxides or oxide salts, while the third are chiefly the one or the other, according as they were formed above or below the groundwater level.

Emmons and Weed coming to the subject from a different but somewhat narrower standpoint, that of a practical field study of a certain class of deposits extending over several years, explained the frequent occurrence of bonanzas or exceptionally rich portions of deposits just below the oxidized zone, or groundwater level, as the result of leaching by surface waters of the upper portions of these deposits, and their re-deposition as sulphides in contact with pre-existing metallic sulphides (especially pyrite) in the zone below.

Through similar processes of chemical reasoning, and with a similar disregard of Posepny's assumption that the groundwater level forms an effective barrier separating the action of the surface or vadose waters from that of the deep circulation, all three arrived at the same general conclusion with regard to the continuance of rich ore in depth, a question that has occupied the attention of geologists and miners since the days of Werner. This conclusion was that, in most ore-deposits, a deeper region exists beyond the influence of surface waters in which the ore is of comparatively low and uniform grade. Van Hise even went so far as to say that in depth all deposits would become low grade pyritic ores, and that all veins would eventually thin out.

De Launay, in his generalizations on Mexican deposits, had already recognized three zones: (1) an upper, oxidized zone; (2) a middle zone of rich sulphides; and (3) a lower zone of low-grade sulphides; he assumed that the enrichment of the middle zone had been brought about by descending waters, but placed it above the groundwater, or hydrostatic level, which in many veins had probably been displaced since their original formation.

In his article 'On metasomatic processes in fissure-veins,' Lindgren placed this theory for the first time on a scientific basis of chemical and microscopical study, and by a classification of veins according to the predominant metasomatic mineral or process involved he made its application much clearer to the student and observer. In his closing remarks he suggested that of late sufficient attention had not been given to the French theory of emanations from eruptive magmas, and that in the case of metals with low critical temperature they may have been first carried up under pneumatolytic conditions, and with the aid of mineralizers while still above the critical temperature, until they reached the zone of circulating atmospheric waters.

His paper on contact deposits (1901), following out this suggestion, served a useful genetic purpose by calling attention to, and clearly defining, a group of deposits for which a pneumatolytic origin would readily be admitted, but of which no important examples had yet been studied in America. The term "contact deposit," which had hitherto been loosely applied, without regard to origin, to all deposits which happened to lie near the contact of any two bodies of rock, was restricted by his definition to those occurring near the contact of igneous intrusives with calcareous beds. They are characterized by irregularity of form, the association of iron oxide and sulphides of the metals with various lime silicates, generally called "contact" minerals because they are found to be the result of contact metamorphism. Typical developments of these contact minerals near Christiania, in Norway, in the Banat in Servia, in Tyrol, Italy, and elsewhere, had been the subject of repeated study and discussion among European geologists since the middle of the century; but the metallic deposits connected with them, being generally of subordinate economic importance, had up to the time of Vogt not been considered worthy of a distinct place in the classification of ore-deposits.

The importance of pneumatolysis in the formation of ore-deposits was practically emphasized by the discovery on this continent, soon after the publication of Lindgren's paper, of a considerable number of economically important deposits—especially of copper—that would come within his definition of "contact deposits."

From a theoretical point of view, the contemporaneous paper of Kemp on 'The Role of Igneous Rocks in the Formation of Veins' presented a more decided opposition to the view so emphatically voiced by Van Hise, that the majority of our ore-deposits have been formed by precipitation from circulating waters of original meteoric origin. In this paper Kemp maintains that the groundwater circulation is not a sufficient agent to account for the majority of our ore-deposits, but that the igneous rocks must have furnished not only their metallic contents, but a large, if not predominating, proportion of the waters which have brought them into their present position.

The controversy which had thus arisen as to the relative importance, in the formation of ore-deposits, of waters of meteoric or of igneous origin, has more recently received a further impulse through discussions provoked by the presentation of proposed genetic classifications of ore-deposits by W. H. Weed and J. E. Spurr. These geologists took an even more advanced position than Vogt in regard to the direct influence of igneous agencies in the formation of ore-deposits, adding silicious segregations to his class of magmatic differentiation products, and very greatly enlarging the scope of his pneumatolytic class. The influence of these new views is already seen in the current literature on ore-deposits, especially in articles where the author, though not in possession of full data, still feels it incumbent upon him to present some tentative hypothesis of origin for the deposits which he is describing.

The wide divergence of views, shown by these discussions among recognized authorities on the subject, might lead one to conclude that we are as far as ever from a universal agreement on accepted theories. A more deliberate consideration of the progress of investigation and verification during this last period, which has been but too briefly and imperfectly set forth in the preceding paragraphs, will show, however, that the advance in this direction has been real and permanent as far as regards the later stages of ore formation, which are more susceptible of actual proof, and that the disagreement lies rather with the ultimate or more theoretical sources of derivation, which must always remain matters of opinion.

THE GEOLOGY OF THE KOLAR GOLD-FIELD.*

BY A. MERVYN SMITH.

The Kolar gold-field, though one of the smallest in the world in point of area, is one of the richest in point of gold production. Up to September last it had yielded no less than sixteen millions sterling in gold, of which six millions has been paid out in dividends to shareholders; the output for 1903 was $11,120,000.

This gold-field may be described briefly as a narrow band of schistose rocks surrounded by

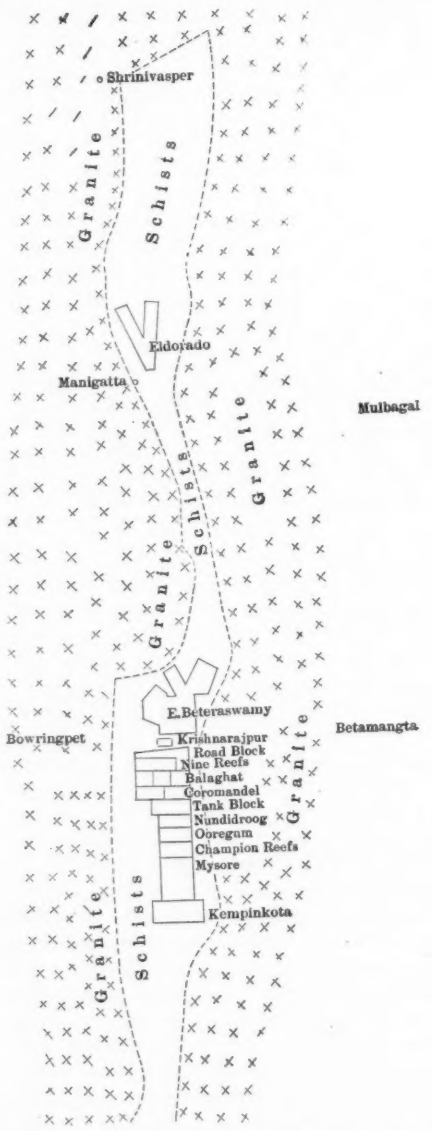


FIG. 1—SKETCH MAP, KOLAR GOLD-FIELD.

granite. Quartz reefs occur in the granite as well as in the schists, but they are known to be auriferous only in the latter. This schistose band stretches north and south a distance of 40 miles, and has a varying width of from one to four miles. The strike of the foliation of this formation, known in Indian geology as the Dharwar, is generally north and south, though, owing probably to the lateral pressure of the intrusive newer granites, the line is somewhat sinuous. See Fig. 1.

That the quartz-reefs were deposited before

*Abstract from a paper, having the same title, read before the Institution of Mining and Metallurgy, London, January 21, 1904.

this lateral pressure was exerted and the folia crumpled, is evident from the fact that the reefs show signs of such pressure in the strained portions of the folds, the quartz here having a flinty appearance and showing a tendency to break into regular flat cakes, due

1. Granite.
2. Mica schist.
3. Quartzite.
4. Hornblende schist.
5. Veined schist.
6. Spotted schist.

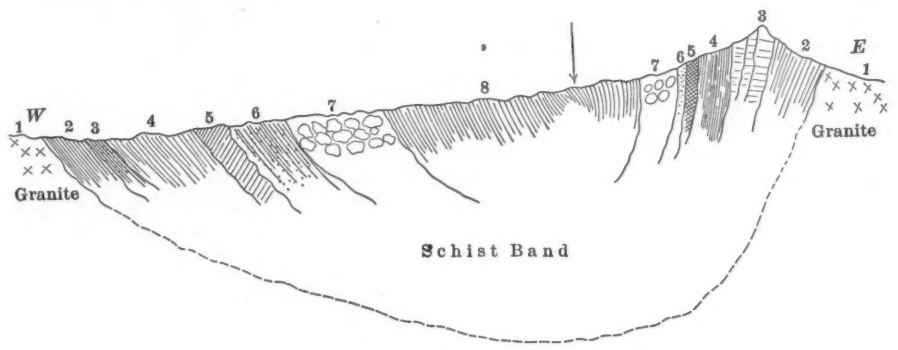


FIG. 2—CROSS-SECTION OF KOLAR GOLD-FIELD.

to the prevalence of joint planes crossing one another at right angles. In the bulges due to this folding the quartz has a comb structure and chalcedonic specimens are not uncommon, both of these features being due to infiltration of quartz in solution into the fractured portions of the reef. The reefs are parallel to the foliation of the schists, and consequently, as already stated, follow a sinuous course with a normal north to south strike. The bulk of the schists are hornblende rocks, bounded east and west by ferruginous and jaspery quartzite. To the west the quartzite ridge is well-marked and of considerable width and height; it stands out prominently nearly the whole length of the gold-field. On the east, the quartzite is not nearly so prominent; projecting outcrops, may, however, be seen occasionally. On the east, the dip of the schists is to the west, at an angle of about 45°, and this dip is maintained for four-fifths of the width of the band, when it suddenly changes to the east at a high angle, 80° to 85°, as shown in Fig. 2.

Mr. Bruce Foote, late state geologist to the Mysore government, considers the Dharwars of

7. Diabase.
8. Hornblende schist.

Bands 4, 5, 6 and 8 are typical hornblende schists, but with distinguishing characteristics that make them easily recognizable in hand-specimens as well as in bulk.

No. 4 is a fine-grained hornblende schist, with included narrow bands of highly feldspathic gray schist.

No. 5 is also a fine-grained hornblende schist, darker in color and harder in texture than No. 4, and cut up into numerous rhombic cakes by an extensive system of jointing. The joint planes are filled with calcareous and quartzose matter cementing adjacent pieces,

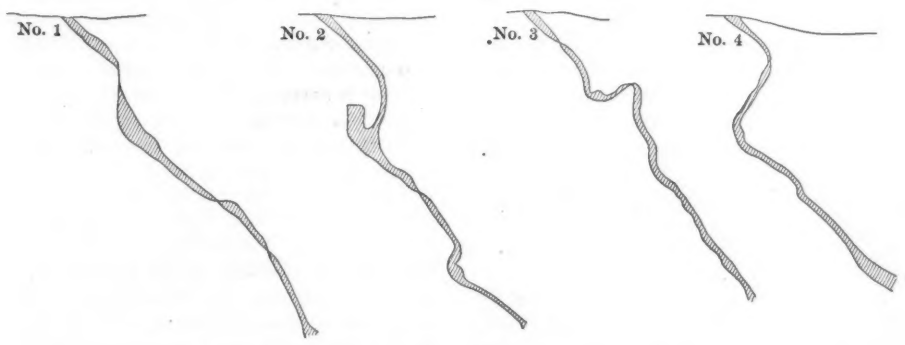


FIG. 4—LEADING FEATURES OF CHAMPION LODE.

No. 1—Rowse's Shaft. No. 3—East Shaft.
No. 2—Carmichael Shaft. No. 4—Tank Block.

the Kolar gold-field to be sedimentary rocks folded into a great trough along with the underlying granito-gneissic rocks. The occurrence of the quartzite bands on the east and west, as well as a duplication of other characteristic bands, give color to this surmise. Fig. 2 shows the following rocks in sequence from east to west:

and giving to the whole a vein structure—hence the name "veined schist."

No. 6 has received the name "spotted schist" from its amygdaloidal structure. The cavities are not almond shaped, but in the form of disks. Weathered specimens have a pitted appearance, owing to the weathering out of the softer calcareous matter which filled the cavities. Hand-specimens show a dark slate groundwork pitted with white spots of the size of peas.

No. 7 is a massive diabase, with no signs of schistose structure. At surface it weathers into a fine black unctuous clay, and gives off large quantities of lime. A few feet under the surface the rock is seen in the form of large rounded boulders, many feet in diameter. Still lower, it becomes one solid mass, cut into great cubes by a system of rectilinear jointing. The rock itself is coarsely hornblendic in the center and finer grained near the selvages. Unlike the other members of the series, this basic igneous rock does not stretch in regular bands north and south, but throws out branches on either side. It is believed, on the Kolar gold-field, that the presence of this rock has much to do with the gold contents of the reef, and that it is only where large masses of this diabase abut against the Champion lode that shoots of rich ore occur. The rock is easily traced at surface, from the green tufted grass that grows luxuriantly in the black loamy soil formed by weathering, while all around is brown and arid. During the hot months the clay surface contracts, and exposes deep fissures, dangerous to ride over. Numerous depressions, due to weathering, occur in this band, and these have been often mistaken for "old workings," which, indeed, they closely resemble.

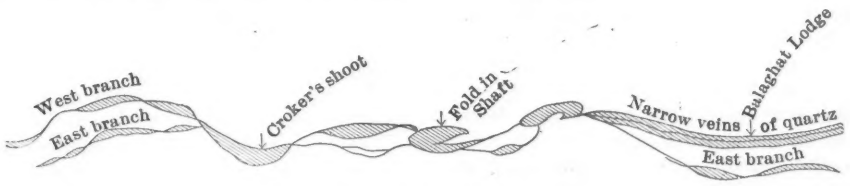


FIG. 3—PLAN OF CHAMPION LODE.

No. 8 is a fine-grained splintery hornblende schist, said by some observers to be an altered volcanic ash. It is in this formation that the gold-bearing lodes occur.

The two chief lodes on the Kolar gold-field are known as the Champion and the Oriental. These run parallel to one another, about 4,000 ft. apart, and both of them occur in the eastern half of the schistose belt. Of the two, the Champion is the more important, as it is on this lode only that profitable mining operations have hitherto been carried on.

The Champion lode occurs along the main line of discission marking the foliation planes of the Dharwar rocks. It is not one continuous body of quartz, but consists of a number of irregular lenticular masses, with much barren ground between. These ore-bodies are folded parallel to the schists, but they have a general north and south strike; they frequently split up into numerous narrow veins of quartz, with layers of country (hornblende schist) between them. During the greater part of its course the Champion lode consists of two branches about 100 ft. apart. It is seldom that both are auriferous. In some places it is the eastern branch that is rich, while a few hundred feet further on the western branch will be found to carry all the pay-ore. In other places, again, the two branches unite and form a large body of quartz of exceptional richness.

Fig. 3 will give a general idea of the course of the Champion lode.

The lode dips west at an average angle of about 45°, but even the dip is sinuous. It

is often vertical, and in places folds back to the east, as shown in Fig. 4. No. 1 shows the dip in Rowse's shaft of the Mysore gold mine; No. 2 shows it in Carmichael shaft of the Champion reefs; No. 3 in East shaft of the Coromandel mine; and No. 4 in Tank Block.

The Champion lode is not uniformly profitable. Very rich ore-bodies occur in shoots; these all crop out at the surface, and have a well-defined pitch to the north. As a rule, there are native workings where the shoots outcrop; and the old workers have gone down in some places as deep as 300 ft. on these patches of rich ground. Between the shoots there is much veinstuff that does not pay to mine. As much as six millions sterling in gold has been taken out of a single ore-body, namely, Croker's shoot, in the Mysore mine.

I have said that the reefs on the Kolar field fold back on themselves in many places. This is particularly noticeable in the case of the Champion lode on the Mysore, Champion Reefs, and Nundydroog properties. Where these folds come to surface, three parallel lodes are seen near to each other, and extending sometimes a length of 200 ft. along the strike of the country, north and south. These folds have a pitch of about 45° north.

Another feature that plays an important part in all questions of development is the occurrence of numerous large dikes. Several hundred dikes of dolerite may be seen cutting across the schist belt from east to west, and a few from north to south. Those running north and south are larger and more marked than the others. It is thought that these basic dikes are younger than any of the other rocks seen on the Kolar gold-field, as they traverse indiscriminately the surrounding granito-gneiss as well as the schists.

Veins of pegmatite also cut across the schists from the east to west, and dislocate the quartz lodes. Mr. Bosworth Smith believes they also cut through the dolerite dikes. If this is the case, then they must be younger than the basic dikes.

To summarize, then, it may be said that all observers who have written on the geology of this field are agreed:

(1) That the auriferous rocks form a narrow band, from one to four miles wide, from east to west, and some 40 miles long.

(2) That the auriferous rocks are bent into a synclinal fold, with a north and south axis.

(3) That the auriferous quartz reefs occur about the middle of the schist band, and are parallel to the layers of the schist, and hence strike north and south.

(4) That the Champion lode, which occurs on the east central portion of the belt, dips west at an angle of from 45° to 60°. Probably the average dip is about 45°, and this seems to be the opinion of the managers of the Mysore mine, who expect to cut the reef at a depth of 2,000 ft. in a vertical shaft sunk 2,000 ft. west of the outcrop.

If. then, the geologists are correct in their conclusions, it follows that the reefs in the Kolar gold-field cannot go deeper than the synclinal; the Champion lode occurs about the middle of the schist band, and its dip is coincident with the foliation of the schists; therefore, it is clear that it cannot extend downward indefinitely.

Cementation is a term covering the filling of interstices in porous or shattered rock by mineral solutions.

ANTHRACITE MINE SURVEYING PRACTICE.

The work done by the surveying parties of the large anthracite mining companies in Pennsylvania probably excels, in combined rapidity and precision, that done by mine surveyors anywhere else. The present practice is largely the outcome of the duties placed upon the companies by the State law of 1891. Thirty years ago surveys underground were made roughly or sometimes not at all and there are many miles of abandoned workings in the anthracite region that were never mapped. The present law requires an accurate map of the workings of each mine on a scale of 100 ft. to 1 in. The map must show the workings on each seam and the connecting planes or tunnels; state the general inclination of the strata, with any material deflection; the tidal elevations of the bottom of each shaft, slope, tunnel and gangway, and of any other points deemed necessary by the mine inspector, and the date of each survey on the most advanced workings. The map must also show the boundaries of the coal lands of the mine, and particularly of any dams or mine workings containing water. When any colliery is worked out, or any lift, preparatory to being abandoned, the map must be extended to include openings worked to the boundary of lines of adjoining, and any parts in which water is to accumulate must be surveyed in duplicate. Surveys of pillars between adjoining properties must be made in duplicate and practically agree. A copy of the mine map must be deposited with the mine inspector of the district, and all new work must be placed on this map at least once in six months and the inspector must have the map furnished him within three months of the completion of the surveys in any mine or part of the mine. Another copy of the map must be kept at the mine.

It will be seen that the law requires exactness in determining the extent of workings and of elevations of all important points, and virtually calls for a survey of each working face once in three months. As the mining companies, from ordinary economy, do not care to increase their surveying staffs unnecessarily, the surveying parties, from the great number of working faces in some groups of mines, must work fast and accurately.

Small concerns have their mines surveyed by local surveyors, usually under contract, but the large companies all have organized staffs. The personnel and methods of work of the survey parties vary somewhat, but the differences are not as great now as they were. An account of the practice of the Susquehanna Coal Company[1] was published several years ago, but that company has since changed its methods somewhat.

In all the important companies the surveying staff for the mines in each district is under the charge of the district engineer, who, in turn, reports to the district superintendent or to the chief engineer. With the Susquehanna Company, the district engineer is virtually assistant district superintendent; but with the others the engineer has less to say about operation of the mines, though he is, of course, consulted in the planning of new work, etc.

This article summarizes the methods of several companies, here denominated, as A, B, C and D.

[1] 'Anthracite Mine Surveying,' by R. Van A. Norris, *School of Mines Quarterly*, Vol. XI, No. 4.

Company A uses parties of six men, a transitment, two side note men, foresight, backsight and fire boss. The fire boss is not a permanent member of the party, but in gaseous mines no party is complete without him. The transitman has charge, but the fire boss determines where the party can go and keeps in advance, though he may assist in the actual work of surveying. The hindsight, who has little to do, carries the dinner pails, oil can, and other impedimenta.

In approaching a new station, the transitman sets up under the last station. He is assisted by the hindsight, who manipulates the legs of the transit, and adjusts it over a spot of paint in the floor left by the foresight. The hindsight then takes a light steel rod, with one end sharpened to a chisel edge and a notch in the other, passes the plumb-bob string over the notch, and inserts the notched end in a hole drilled in the roof by the foresight. The transitman adjusts, by the sliding head, his transit under the plumb-bob and the hindsight with a small tape measure the height of the instrument, and the roof distance. The transitman then sends the backsight to a previous station, the backsight steps off the distance to avoid delay and having found the station, inserts a rod in the hole in the roof and holds his light so that the transitman can sight on the plumb-bob string. The transitman has previously looked up in his notes the proper back azimuth, the object being to set on a course previously read with the same instrument.

Meantime the foresight has gone on ahead, and with the aid of the transitman and fire boss has established a new station, drilling a conical hole in the roof with the chisel end of his rod, and marks this hole by white paint, with some distinguishing number, as a square, circle or triangle, to avoid confusion with surveys by some other party, and with a number. Care is taken to keep the brush clean and not allow the paint to get dirty from the brush removing slime and soot from the roof. The hole number is continuous for all the stations established from some main haulage way on a particular vein. The foresight next reverses his rod, passes the plumb-bob string over the notch in the other, inserts this end in the hole, and allows the string to run out till the bob strikes the ground. The point where the bob touches the floor is marked by a spot of paint; if the floor is covered with loose dirt, then the spot is put on a piece of slate, to enable the transitman to make his next set-up, and also for convenience in getting the roof distance. The second note-man assists the foresight. By this time the transitman has set up and taken a back sight, and next sight on the string over the rod held by the foresight. The backsight calls out the elevation of the instrument, the foresight measures this distance, and holds a pin, called a measuring pin, a short brass rod divided into tenths and hundredths, to give the height of the instrument on the rod. Where the difference of elevation is too great, he will add or take off a foot. The roof distance is next measured by a tape. If the roof is high, the loop in the end of the tape is passed over a rod. All that remains is to measure the distance from the transit. The first noteman has the reel end of the tape at the forward station; the backsight pulls the tape. When the transitman catches the 0 mark of the tape on the plumb line, he calls "measure," the first note-man replies "right," then the measurement is repeated as a check.

Ordinary steel tape, 300 ft. long, is used, on open wood spools, and graduated to feet by brass sleeves. No balance is used to determine the strength of pull, the pull being a matter of training and experience, and no correction is made for temperature except that on surface work connecting shafts the measurements may be corrected to the average mine temperature. All angles are measured by continuous vernier, South being zero. Angular measurements are checked by the needle and when possible tied at frequent intervals. If the needle reading indicates that something is wrong the transitman locates the trouble at once. The usual length of sight is 75 to 100 ft., because stations are usually established at the foot of each chamber. A transit is not used to run up all chambers where the pitch is over 35, but distances are measured and occasionally a line is run up from which the general swing of the other chambers can be determined.

When the distance between two stations is determined the tape is stretched on the ground and the second note-man starts at the instrument and calls off measurements to the rib on either side at intervals of not over 25 ft., measuring perpendicular to the tape. He may carry a light stick 6 ft. long for convenience in measuring. At the face of a chamber he notes the thickness of the coal, and if it is clean or not. The first note-man records all notes and makes a section showing the coal and slate at the face. While these notes are being taken the foresight has gone on, possibly through a heading, and is establishing a new station.

All transit notes are recorded by the transitman, all side notes by the first note-man, and no attempt is made to sketch to scale. At the office the notes of the two books are plotted by the transitman or first note-man, while they may be traversed by other members of the party. All work is platted by co-ordinates, all sights being platted before any side notes. The transitman's platting is checked by another man taking his book and going over the platting with a protractor. The first note-man and transitman compare distances measured before leaving the mine, and these distances must agree. Any 'fudging' of notes, if detected, means prompt dismissal.

A NEW COAL DISCOVERY IN FRANCE.—It is reported that coal has been found at a depth of 700 m. at Eply, in the French Lorraine, a few miles from the German frontier.

MANGANESE EXPORTS FROM SPAIN.—The *Revista Minera* reports that during the year 1903 there were 59,035 metric tons of manganese ore exported from the province of Huelva, in Spain.

IRON PRODUCTION IN BELGIUM.—The production of pig iron in Belgium for the calendar year is reported as follows, in metric tons:

	1902.		1903.	
	Tons.	Per ct.	Tons.	Per ct.
Foundry pig.....	108,560	9.8	99,902	7.7
Forge iron	256,435	23.3	268,498	20.7
Steel pig.....	737,915	66.9	930,811	71.6
Totals 1,102,910		100.0	1,299,211	100.0

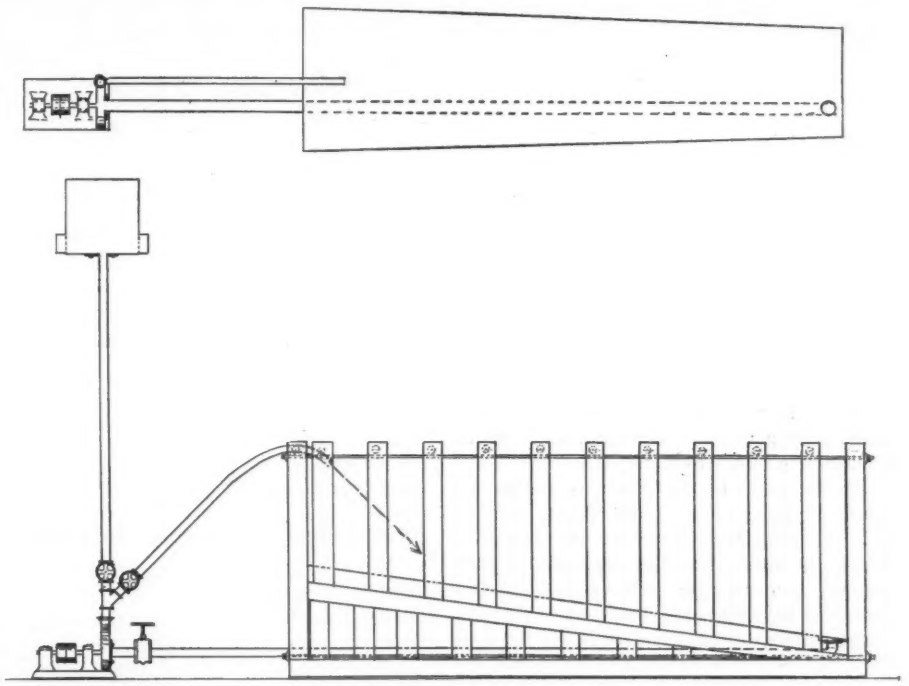
Steel pig includes bessemer and basic iron. The increase in the total output last year was 196,301 tons, or 17.8 per cent; the gain being chiefly in steel pig.

A TRAPEZOIDAL SLIMES AGITATOR.

By Courtenay De Kalb.

So far as the writer is aware, the use of a trapezoidal box for the agitation of slimes with cyanide solution is new, and the results obtained at the Exposed Treasure mine, at Mojave, California, where a box of this character was recently installed, are sufficiently interesting to warrant a description of the device.

Agitation of slimes at this plant had previously been accomplished by compressed air in the same tanks in which the pulp was subsequently allowed to settle for decantation. The tank capacity of the plant was insufficient to admit of a greater number of decantations without leaving a portion of the slimes untreated, and the conditions were unsuitable for storing slimes. Laboratory tests of samples of the agitated pulp showed that about 90 per cent of the total values had been dissolved by the first agitation, which was not sensibly increased by the second agitation. The difficulty, as usual, was to extract these solutions economically from the slimes, so as to effect a high recovery.



TRAPEZOIDAL AGITATOR BOX.

After agitation with air, the pulp settled very slowly, apparently due to the retention of small globules of air on the particles of the slime. It is also probable that the flocculence of the argillaceous portion of the slimes was increased by the action of the air. A centrifugal pump, 4-in. suction and discharge, was then connected to two of the tanks, and a very great difference in the rapidity of settling and amount of solution which could be decanted was immediately noticed. But as the difference was not sufficient to permit of three dilutions and decantations with each charge, it was decided to construct a separate agitator, and use the tanks only for settling. The air-pipes were retained in the tanks, as a convenient means of mixing the pulp with the diluent water after the initial decantation. I proposed a trapezoidal box, and finding that my cyanide assistant, Mr. Walter J. Pentland, had conceived a similar idea, the agitator was promptly constructed.

It consists of a box having both vertical and horizontal sections trapezoidal. It measures 30 ft. in length, is 6 ft. deep at the shallow end, 10 ft. deep at the deeper end, is 7 ft. 8 in. wide at the shallow end, and 6 ft. wide at the deep end. It was built of 3-in. redwood lumber, well braced and tied, and mounted upon an inclined framework. Near the center of the box, at the deep end, was connected a 6-in. pipe, turning at once into a near-by horizontal position, and leading the pulp to the centrifugal pump, placed 11 ft. in front of the shallow end of the box. Immediately above the discharge of the pump was placed a 45° Y, with a valve beyond each branch. The 45° branch led by a gently curved pipe just over the edge of the box, adjusted so that the pulp would be delivered on the median line of the box, at such an angle that the stream would strike the bottom at a distance of 6 ft. 8 in. from the front end. From the delivery end of this pipe the stream would impinge upon the surface of the pulp at a distance of about 10 in. from the nozzle. The vertical branch of the Y was continued up 22 ft., measured from the center of the suction of the pump, to a distributing box, 4 ft. square by 4 ft. deep. After agitation, the valves are changed to pump the charge to the distributing box, from which it is carried by appropriate launders to the various settling tanks. The pump runs at an average rate of 460 revolutions per minute, and, when agitating the pulp, it is working against a head of only 2 ft. In consequence of this, the velocity of the stream is very great, and a high force of impact is obtained. The result of this is to condense the flocculent particles of the slime, increasing their apparent density, and thus promoting more rapid settling. Air is carried into the pulp entrained by the stream from the pipe, so that aeration is very perfect, bubbles of air rising to the surface from just beyond the point of impact to the extreme end of the box. Agitation is active also to the farther, or deep, end of the box. The constriction of width toward the deep end of the box promotes this result, while the expanded width at the shallow end favors

the formation of eddies on each side of the stream, which keep the pulp at that end in motion, carry it constantly into the path of the stream, and effectually prevent the formation of banks. Agitation is complete at the end of 4½ hours; but, having the time, agitation is usually prolonged to 8 or 9 hours. Near the end of the agitation, lime is added, for mechanical reasons only, and is thus thoroughly incorporated before the charge is pumped over into the settling tanks. Lime is also added with each dilution, which would probably not be required if the subsequent mixing of pulp and water after the first decantation were not done with air. Four decantations from each charge are now regularly obtained, this being facilitated by the rapid settling of the pulp after agitation in the trapezoidal box. In consequence, the volume of solution now handled is 30 per cent greater than formerly, but the amount of lime required is only 21 per cent greater, and the quantity has actually fallen from 1.366 lb. per ton of solution to 0.995 lb. As a consequence upon this reduction of the alkalinity of the solutions, the zinc consumption in the precipitation boxes has declined from a previous minimum of 0.1658 lb. per ton of solution to 0.1128 lb.

The net result of the change to centrifugal pump agitation in the trapezoidal box has been to increase the extraction from an average in August, September and October, 1903, of 67.04 per cent to an average in November and December of 74.27 per cent, a gain of 7.23 points. The extractions of gold and silver and the total recovery are shown in Table 1, in which the results are deduced from averages of the daily assays. The percentages given are those actually obtained, but the assays as stated in the table are relative, being altered by a constant ratio throughout. It will be noticed that the amount of zinc used in November was excessive. This was due to the fact that the zinc employed during that month was of inferior quality, containing a large percentage of lead.

Each slimes charge consists of from 18 to 21 tons of solid matter, the water in the charge amounting to from 68 per cent to 72 per cent of the whole, by weight. The strength of the cyanide solution in which the charge is agitated is 0.12 per cent KCy.

As matters of collateral interest, the following additional facts may be stated.

The slimes consist of quartz fines, clay, manganese dioxide and sericite. An analysis of the original ore, as fed to the batteries, gave:

SiO_2	80.22 per cent.
FeO	6.62 " "
Al_2O_3	2.43 " "
FeS_2	0.29 " "
PbO	0.24 " "
MnO_2	5.75 " "
CaO	1.56 " "
MgO	0.40 " "
$Na_2O + K_2O$	0.50 " "
CO_2	1.76 " "
Total	99.77 per cent.

The water used is highly alkaline, and contains sulphates, which, however, do not act as cyanicides, as repeated tests have shown. The only effect on addition of the KCy to this water is the precipitation of aluminum hydrate. An analysis of this water shows:

SiO_2	0.467	grains per gallon.
Al_2O_3	1.978	" " "
CaO	5.987	" " "
MgO	1.865	" " "
CO_2	3.356	" " "
NaCl + KCl	2.850	" " "
SO_3	1.003	" " "
Total solids	17.506	grains per gallon.

A screen analysis of the slimes gave the following result:

Mesh. No.	Diam. of Screen opening. in.	Per cent of total left on each Screen.	Assays Gold, oz. per ton.	Assays Silver, oz. per ton.	Assays Value per ton.
34	0.018	0.089			
50	0.013	0.117			
70	0.009	0.170	0.384	2.752	$9.056
90	0.006	0.129			
120	0.004	0.370			
150	0.003	8.447	0.056	1.864	2.048
Finer than 150	....	90.675	0.112	3.408	3.944
		99.997	0.109	3.28	$3.83

It should be noted, with reference to the above screen analysis, that the difference in size between successive diameters of screen openings is in accordance with a constant rate of diminution of 0.001 in.

TABLE NO. 1.

Months.	Assays of Heads: Gold, oz. per ton.	Silver, oz. per ton.	Total value.	Assays of Tailings: Gold oz, per ton.	Silver, oz. per ton.	Total Value.	Percentages of Extraction: Gold.	Silver.	Total.	Agitation.
August	0.1766	4.111	$5.584	0.375	2.143	$1.816	78.77%	47.88%	67.47%	By air
September	0.2088	5.272	6.814	0.040	2.696	2.152	80.83%	48.86%	68.41%	"
October	0.1784	3.416	5.272	0.0416	2.008	1.832	76.68%	41.21%	65.25%	"
November	0.2064	3.752	6.008	0.0368	1.920	1.696	81.71%	48.70%	71.77%	By pump
December	0.2160	3.552	6.096	0.0308	1.600	1.416	85.75%	54.91%	76.78%	"

TABLE NO. 2.

Months.	No. of Charges Treated.	Total Lb. Lime Used.	Lb. Lime Used per Charge.	Total Tons Solution Decanted.	Lb. Lime Per Ton of Solution.	Total Lb. Zinc Used in Precipitation.	Lb. Zinc Used Per ton of Solution.	Agitation.
August	30	3,600	120	2,635	1.366	489	0.1855	By air
September	31	3,760	121	2,997	1.254	497	0.1658	"
October	39	5,000	128	3,871	1.291	698	0.1803	"
November	32	4,554	142	4,079	1.116	864	0.2118	By pump
December	26	3,993	153	4.013	0.995	458	0.1128	"

STEEL VESSELS ON THE GREAT LAKES.

The Cleveland *Iron Trades Review* says that the transition from wood to steel vessels on the great lakes is being rapidly made, as is shown by the building of new craft and the passing of the old. During the season of navigation of 1903 no wooden ships were built and 52 passed out of existence by being wrecked, while probably half as many more made their last trips and will never sail again. The lost vessels were valued at $924,600. From the marine underwriters' standpoint, the season was the most disastrous since 1898. The aggregate of losses of all kinds, including cargoes, was about $2,100,000. The season was notable in that all the total losses were confined to wooden ships. Not a steel ship was lost, and the partial losses on this class of property were much lighter than usual. There are now no fleets of damaged vessels awaiting their turn at the shipyard for repairs. In fact, the repair work has been discouraging to the shipyards all the season. The aggregate of such work all through the year will not be $400,000, while the partial losses on wooden steamers and barges will exceed $250,000.

SWEDISH IRON ORE EXPORTS.—The exports of magnetic iron ore from northern and central Sweden in 1903 were 2,537,214 metric tons. Of the total exports, 1,949,477 tons were forwarded to Germany, and the remainder to Great Britain, Belgium and other countries.

EDWARDS' MECHANICAL ORE-ROASTING FURNACE.

By F. DANVERS POWER.

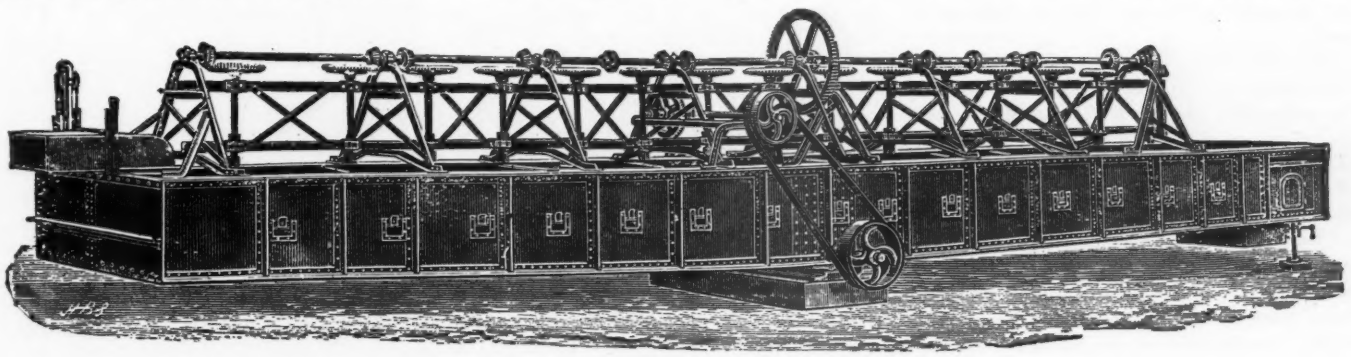
There are three different types of Edwards furnaces, each of which has its own particular sphere. They have certain points in common, such as the method of rabbling, but the bodies of the furnaces are designed differently to suit the nature and requirements of the ore to be handled as well as the local conditions. All three types are patented throughout the Australian Commonwealth, New Zealand, America and Africa.

Mr. Thomas Edwards, the inventor of these furnaces, is the proprietor of custom metallurgical works at Ballarat and Bendigo, the two principal gold-fields of Victoria, his experience in the treatment of refractory auriferous ores of various sorts having extended over a period of 36 years. During that time he tried the revolving pan, revolving cylinder, multiple hearth and other types of mechanical furnaces, but the only kind by which he could get a thoroughly sweet roast was the old reverberatory worked by hand. Mr. Edwards thought he could design a furnace that would do the work quicker, and at a lesser cost for fuel and labor. One of his furnaces, when working side by side with the hand-reverberatory furnace was found to give a more uniform roast, and was thoroughly under control. The operations of feeding, stirring and discharging are each carried on independently, and are capable of any desired adjustment; there is no dusting, as in the case of drop furnaces, neither is there any fear of overheating the ore at the commencement of the roast, as is sometimes the case with double hearths. Any fuel may be used in the Edwards furnaces—coal, wood, oil or gas.

Edwards No. 1, or tilting furnace, is a straight single-hearth reverberatory furnace, 63 ft. long by 9 ft. wide over all, and 58 ft. by 6 ft. 5 in. in the clear, which is designed for roasting concentrates or sulphide ores sweet. The shell of the furnace is a rectangular chamber of plate-iron stiffened with angle-iron; this is lined inside with brick. Good common red bricks are found suitable for ordinary temperatures, though at the fire end fire-bricks may be used. Ten thousand bricks are required for the lining of this furnace. On the top of the furnace is mounted gearing for driving the rabbles, the spindles of which extend down through cast-iron boxes, built into the brickwork of the roof to the hearth of the furnace. The whole furnace rests on two pivots, one for each side. These pivots are arranged near the middle of the length of the furnace, so that by tilting the furnace from the horizontal to various angles, the discharge of the ore may be regulated according to the rate at which it is being roasted. The mechanism for tilting the furnace is simple, and can be worked without altering the usual speed of the rabbles. The weight of the whole ironwork, including the shell, bracing, shafting, gearing, rabble, etc., is 19 tons. No single part of the furnace exceeds 2,500 lb. in weight, while most of the parts do not exceed 225 lb.; it will, therefore, be seen that this furnace is easy to transport, and, unlike those that are solely brick structures, when no longer required in one locality, it may be dismantled at little expense and removed to another place. No costly foundations are required; all that is necessary are two concrete blocks for the pivot-bearings

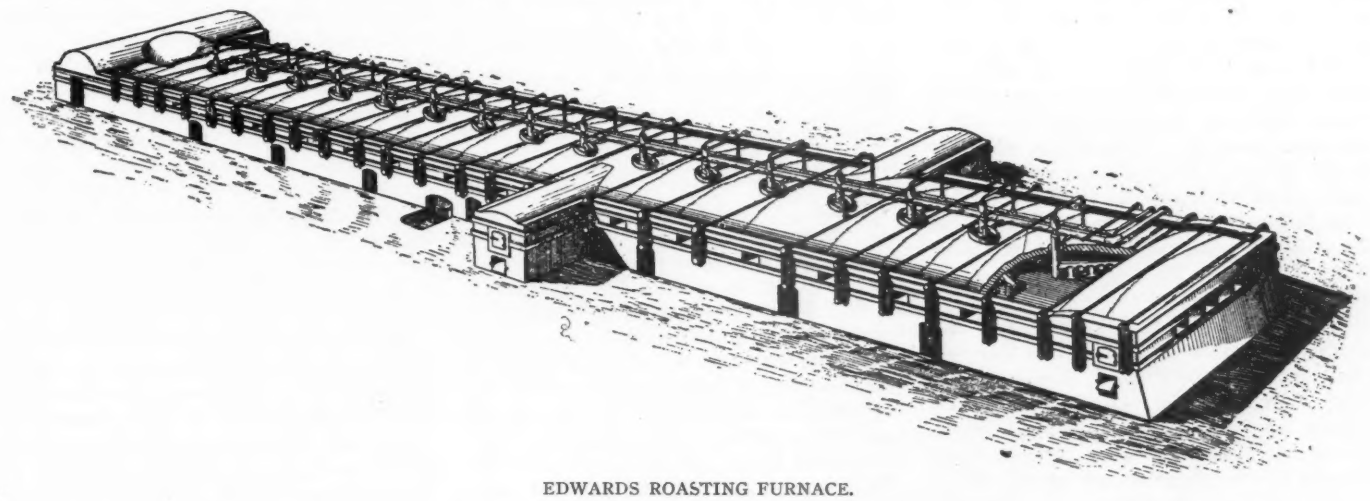
to rest on. The bottom of the furnace is supported on No. 14 corrugated steel; directly on this is placed a thick layer of infusorial earth or other suitable non-conducting material, with the object of retaining the heat of the furnace. On this is laid the brick floor; or instead of bricks, the floor may consist of moistened clay well rammed to form an even surface, so that the ore can be moved over it by the rotating rabbles. The brick lining of the first Edwards furnace built at the Ballarat works is still good, and has every appearance of lasting many years yet; no trouble is experienced with collapsed roofs. At works where roasting-furnaces are only used intermittently, the damage sustained by an Edwards furnace, due to expansion and contraction, is very much less than that to a brick structure.

There are 15 rabbles placed side by side along the length of the furnace, the stirring portions of which nearly touch the hearth. Each rabble has a circular path, the circumference of which almost touches the brickwork on either side, and as the distance between the rabbles is a little greater than the radius of the circle described, each rabble works ore almost up to the heel of its neighbor, consequently the amount of hearth area unworked by the rabbles is very small; and as each rabble rotates in the opposite direction to the one next it—they are alternately right and left-hand rabbles—the ore is not passed along too rapidly from one end of the furnace to the other, but gets a thorough stirring and exposure to the air as it proceeds on its course. The speed of the first 13 rabbles from the feed end is one revolution per minute, while the 14th has two, and the 15th, or discharge, rabble four revolutions per minute. All the rabbles being driven from the same shafting, the change in speed is arranged by alternating the ratio of the bevel wheels. The speed of the 14th and 15th rabbles is so arranged that while they stir into the areas of the adjacent rabbles, they do not come in contact with them. The object of this increased speed is to give the ore a brisker stirring in the final stages of the roast, in order to get rid of the last trace of sulphur. So as to protect the rabbles in the hotter part of the furnace from the destructive action of the high temperature, water is circulated through the last three to keep them cool; by this means they are found to last for years. There are two different kinds of rabbles used: one is solid and flat-footed, the front edge of which is beveled; the other is hollow; on the arm of it cast-iron shoes are fitted. The latter rabble is the one used at the fire end of the furnace. The cast-iron shoes can be slid on or off the rabble arm without lowering the heat of the furnace or removing the rabble from it. When roasting concentrates, or ores high in sulphur, the first 10 rabbles, counting from the feed end, are generally of the solid, flat-footed type; these pass through the ore close to the hearth and effectively stir and expose the particles of ore so long as they carry a fair percentage of sulphur. The last five rabbles are provided with cast-iron shoes, as by the time the ore reaches this part of the furnace it has lost most of its sulphur and is less lively. These shoes pass through and under the ore. They make a more effective stirrer when the ore lies dead, and they leave a corrugated surface behind, thus exposing a greater area for oxidation than if the surface were level. When roasting ores that do not contain much sulphur, shoes are used on all the rabbles, though, of course, water need only be circulated through those subjected to the greatest heat. The wear and tear of the whole furnace is only nominal, and is confined almost exclusively to those rabbles nearest the fire; even these last for years when properly cooled by circulating water. When they have to be removed, the cost is very slight, and they can easily be renewed by unskilled labor in a few minutes. The power required to work the furnace is less than 1 h. p. per furnace. The ordinary flat-footed rabble arm is fastened to the spindle by placing the end in a socket and passing a pin through both. The water rabbles have a 3⅛-in. cast-iron hollow spindle with a flange at the bottom, which is bolted on to a corresponding flange on the upper part of the arm.



EDWARDS ROASTING FURNACE.

The ore is conveyed by an automatic feeder from the hopper onto the hearth at the upper end of the furnace; after traveling to the lower end, near the fire, the ore is discharged down a pipe, situated near one of the sides; the bottom of this pipe passes through and works in a case leading to the conveyor, which effectively prevents any escape of dust. This conveyor pushes the ore into the pit. During the roasting air is admitted through end holes, situated above the fire-bars. The fumes pass into the main flue through a short flue, which is attached to the furnace. To allow for the movement of this short flue when the angle of the furnace is altered, the hole in the main flue through which it passes is made larger than actually required for a nice fit; in order to cover the space left between the short and main flues, and prevent cold air passing into the latter, a sliding cover-plate moves in a frame, which is bolted onto the brickwork of the main flue.



EDWARDS ROASTING FURNACE.

In Australia there are over 60 of these

furnaces. They are mostly used for the sweet roasting of auriferous ores of various sorts as a preliminary to treatment by the chlorination or cyanide processes, though some are used for preparing copper ore for smelting, as at Burraga. The capacity of the furnace naturally varies with the character of the ore, whether a sweet roast is required or not. When sweet-roasting the heaviest auriferous concentrates, this furnace has a capacity of seven to nine tons per day; but, when sweet-roasting West Australian sulphides carrying 6 per cent of sulphur, it has a capacity of 21 tons per 24 hours.

Edwards' No. 2 fixed furnace is built at a slight angle, dipping toward the discharge end, the amount of inclination being determined beforehand as that most suitable for the class of ore to be dealt with. The general design of this furnace will be seen on referring to the accompanying illustration.

The furnace may be built of concrete, stone or brick from the foundation to within 6 in. of the hearth; above this it is finished with brick, or the furnace proper may be carried on iron supports. The ore is stirred on the same principle as the No. 1, or tilting, furnace, only in this case the gearing for driving the rabbles, instead of being put above the furnace, is placed in a tunnel running longitudinally beneath the hearth, where it is protected from dust; the rabble spindles pass through cast-iron sleeves, built into the bottom of the furnace. The furnace shown is 9 ft. wide, but may be made up to 14 ft. wide in the clear, and 300 ft. or more, in length. Experience shows that when roasting sulphide ores, wide hearths, which necessitate high roofs, destroy the reverberatory action on the ore. If the roof is within a reasonable distance of the hearth, the radiation from the hot ore assists in keeping the arch hot, which, in its turn, throws the heat back on the ore; but, when the arch is too high, this does not take place to the same degree, the heat tending to collect in the highest part of the roof, and is then carried away by the draft to the stack; to work such a furnace increases the cost of fuel. Sleeves built into the hearth, through which the rabble stems pass, also serve to admit air to the furnace. These sleeves project some inches above the hearth, so as to prevent ore from falling through the space between the sleeve and the rabble spindle. The bottom ends of the sleeves are fitted with sliding plates, which can be opened to any reasonable extent so as to admit air for oxidation purposes. Air entering the middle of a furnace in this way does much better work than if it enters at the sides. The frames let into the roof of the furnace, for the withdrawal and replacing of rabbles, are placed alternately between every two rabbles, one frame thus serving the rabbles at either end of it. Besides the end fire-place, there may be any number of side fire-places, depending on the requirements of the ore, arranged at intervals on either side of the furnace. The rabbles are well cooled by water in a simple manner; wear and tear is confined to the shoes on the rabble arm, which last a long time and are easily removed. The shoes are arranged parallel with the length of the arm, and as they are pushed forward the ore is scattered on either side and rolls over the projection on the bottom of the shoes. Entrance to the tunnel under the furnace is gained through man-holes, so that the gearing can be oiled and the air to the furnace regulated. In the throat of the furnace there is a damper to regulate the draft. One of these furnaces, 120 ft. long by 9 ft. wide, will roast 60 tons of Kalgoorlie (W. A.) ore, containing 6 per cent of sulphur, in 24 hours, suitable for subsequent treatment by the cyanide process.

Edwards' No. 3 furnace is also a fixed reverberatory furnace with an inclined hearth, and, like the No. 2 furnace, is built of concrete, stone or brick, may be up to 14 ft. wide, and of any desired length. The rabbles are similar to those of No. 1 furnace, and the gearing is likewise placed on the top. Side or auxiliary fires may be used, as in No. 2 furnace, if required.

One of the main objects of this furnace is the conservation of heat. A chamber is left beneath the roasting-hearth, which is divided by a wall for the greater part of its length into two sub-flues. The furnace gases pass from the hearth over a bridge, down into the first sub-flue, then into the other, and from that into the main flue and away to the stack. So long as the temperature of the gases in the flue exceeds that of the underside of the hearth, there is a saving of fuel. Should the heat be found excessive for the sweet-roasting of heavy sulphides, or should it be required to clean out the sub-flues, the damper can be closed and the furnace gases diverted into the flue another way. The speed with which the ore passes through the furnace may be regulated by changing the speed of the rabbles, the form of the shoes, and the rate at which the ore is fed into the furnace.

TIN PRODUCTION IN BOLIVIA.

By JUAN B. MINCHIN.

The production of tin from the mines in the neighborhood of Oruro, in Bolivia, during the year 1903, was considerable. The following table shows the output of tin-ore concentrates, or *barilla*, from the different mines, all of which was shipped. The figures are in tons of 2,000 lb., and the final column in the table gives the average contents of the *barilla* in metallic tin.

Name.	Tons.	P. c. tin.
Abelli & Co.-Avicaya	1,004	71
Cia. Minera Huanuni	664	68
Chuncho-Antequera	587	70
Cia. Minera Uncia	600	64
Total	2,855	..

It will be seen from this table that the total contents of the shipments amounted to 3,838,520 lb. metallic tin.

The following notes show the condition of the tin mines in this district:

The Avicaya mine is under the control of Don Dante Abelli, who is general manager and half-owner of the property. During the past year electric lighting has been introduced here, to facilitate night work in the concentration mill. A gas engine of 60 h. p. and two petroleum engines of 16 h. p. each are used at the mill. The grinding machinery includes a 15-stamp mill with 650 lb. stamps and three No. 4 ball-mills. The concentration plant comprises six Wilfley tables, four round buddles and automatic jigs. The mine has reached a total depth of 95 meters, the ore being extracted through a vertical shaft, provided with a steam hoisting engine of 20 h. p. It is conveyed to the mill, situated 2,900 meters from the shaft, by a wire ropeway.

The Huanuni mine is under charge of Mr. John Richards as general manager. At this mine the steam engine formerly used has been replaced by a gas engine of 60 h. p., which operates the dynamos. Electric power for hoisting is transmitted from this plant to the mine. The crushing machinery consists of a 10-stamp mill, with 850 lb. stamps. The size of the mill is to be doubled by the addition of 10 stamps. The mine has reached a depth of 80 meters below the adit. The ore is carried to the mill by a wire ropeway 1,500 meters long. Electric lighting has also been recently adopted in the mill.

At the Chuncho mine Mr. Thomas J. Hooper is general manager. This is a comparatively new enterprise. Steam power is employed at the mill, which contains 10 stamps of 850 lb. each, with Wilfley and revolving tables and round buddles.

The Uncia mine, which is under charge of Mr. W. E. Stuart-Monteith, is still worked in a rather primitive manner. The ore is ground in part by small rolls run by a Pelton waterwheel, and in part under rocking stones, or *guimbaletes*. The concentration is effected with a Wilfley table, two automatic jigs, two round buddles and a few hand buddles and jigs. The company is now building a wagon road 45 miles long to the nearest railroad station, and steam machinery has been ordered, together with an electric power plant. It is proposed to install this plant at a distance of 4,000 meters from the mine, and to transmit the power that distance to run the hoists. An order has also been given for a wire-rope tramway to carry ore to the mill.

Among other enterprises, which have been giving favorable results during the past year, I may mention the Chorolque mine, belonging to Don F. Avelino Aramayo; the Totoral Mining Company, the Llallagua mines, operated by Don Pastor Saiuz, and La Salvadora, owned by Don Simon Patiño.

The Quimsa Crur district, in the province of Inquisivi, has recently been receiving a good deal of attention, and important tin deposits appear to exist there; but, owing to scarcity of capital and defective transportation, little development work has been done as yet. The mines of this district are situated in the great Cordillera, and have one great advantage over those of the Andean tableland. There is almost everywhere an ample supply of water for power purposes, usually with rapid fall and high head, so that power can be cheaply obtained.

THE DRILLIBITE.

The accompanying illustration shows a recently invented apparatus for holding the drill steel in position, and for automatically rotating it between each blow. By its use one man can drill a hole, without having the assistance of a second for holding and rotating the steel. The steel is placed through a cylinder, is gripped tight by an annular piston, and is kept up to the work by a spring. The cylinder is mounted, by means of a double joint, on a spreader-bar, up and down which it can slide, so that the steel can be raised to any height and turned in any direction. If the apparatus is used on open work, where a top rest for the spreader bar is unobtainable, a tripod with pointed feet is used instead of the spreader-bar. The drill is turned by means of an escapement motion, inside the cylinder, which is set in operation through a wire or chain worked by a pedal.

After the apparatus has been placed in posi-

tion, the operator stands with one heel on the pedal, and after he has delivered each blow on the head of the steel, raises his heel, thus allowing the steel to rotate one notch. With half an hour's practice a man can deliver 60 blows a minute with ease.

From an examination of the apparatus, we are of opinion that it is of considerable promise, especially where labor is expensive. There

THE DRILLIBITE.

is no intricate or delicate mechanism that could be damaged by clumsy work, and no part is likely to wear out rapidly. It does not occupy much space, and can be used in any place where a hammer can be effectually swung. The weight is about 65 lb., so that one man can carry it easily; while the various clamps for the steel and for the adjustment of its position are so simple, that the whole thing can be placed in position in a minute. There are adjustments provided for altering the speed of rotation of the drill, and for adapting it to long or short-legged men.

The drillibite is applicable to all mining operations where machine drills are not possible, such as prospecting, preliminary development, and where mining is not conducted on an extensive scale. In quarrying building stone, it has the advantage that the holes are drilled more regularly, so that there is less likelihood of erratic fractures. The apparatus is made by the Charles Simmons Drillibite, Ltd., of London, England.

COAL PRODUCTION OF WASHINGTON.

We are indebted to Mr. C. F. Owen, State Inspector of Coal Mines, for the following advance statement of coal and coke production in Washington in 1903. Inasmuch as the official report is published biennially, the next issue appearing in 1905, the effort made to collect and distribute this information at so early a date will be generally appreciated.

The year's operations in the mines may be characterized as most satisfactory. The output was larger by 18.57 per cent than that of 1902, while the number of fatalities showed a decrease of no less than 26.6 per cent as compared with the previous year. Of the output in 1903, the home markets consumed 2,241,568 tons and 948,909 tons were exported. The production of the State by counties was as follows:

	Short Tons.
Kittitas	1,376,017
King	1,216,518
Pierce	575,286
Skagit	19,256
Lewis	1,800
Thurston	1,000
Whatcom	600
Total	3,190,477

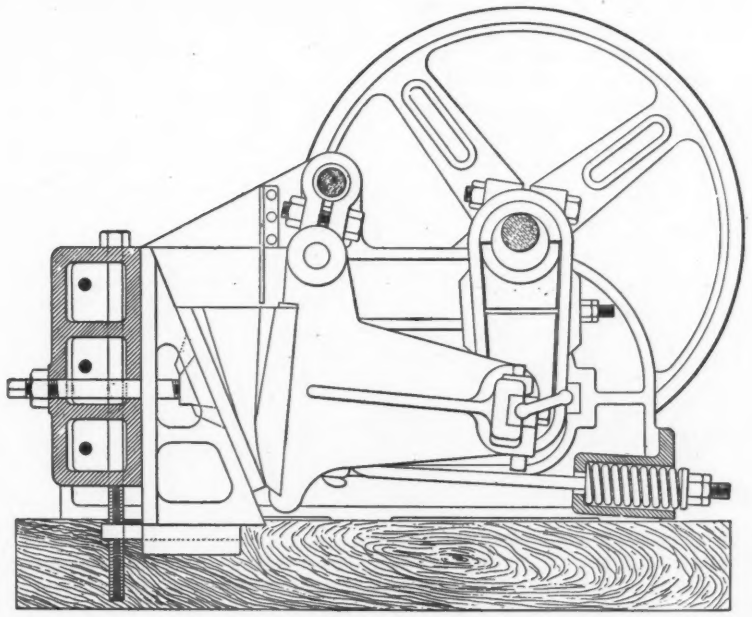
The value of the coal at the mine was approximately $2 per ton, making the total value of the output $6,380,954. The coke ovens in Pierce county manufactured 47,916 tons of coke, valued at $239,580. There were 4,876 miners and other laborers employed for an average of 306 days, earning a mean daily wage of $2.67. A total of 104 accidents was reported during the year, of which 83 were non-fatal and 25 were followed by death of the person injured. This shows an average of 5.13 killed and 17.02 injured per 1,000 employees. The coal mines of the State, as a whole, are under experienced and competent management. All the latest appliances known to mining technology are employed for the protection of life and property. The mines that throw off fire-damp are equipped with powerful ventilating fans, and those that are dusty are provided with appliances for sprinkling.

Nearly all of the companies now engaged in mining have advanced their workings and made new openings during the year. The Pacific Coast Company has bottomed the shaft in No. 2 mine, Franklin, at a depth of 1,350 ft., and a slope will be sunk on the Gem mine for a second opening. A new water level tunnel is being opened on the Gem, and the workings are being extended on the second level of No. 7 mine. The company is driving a cross-cut tunnel at Coal Creek which will tap six underlying veins, two of which, having 1,000,000 tons above water level, will be in operation during the present year. The Issaquah Coal Company has extended No. 5 slope to another level. The new mine opened by Mr. Fred Nolte, on Section 15, near Palmer, should add considerable to the output of the year. This is a 5.5-ft. vein of excellent quality, with sand rock, top and bottom. Mr. P. Gibbon, of the Occidental mine, will sink a slope on what is supposed to be the McKay vein. The Carbon Hill Coal Company has opened three veins of coal on the north side of the river; sunk the Wingate slope to another level, and opened a new 4-ft. vein underlying the latter. The company is continuing the slope on No. 6 to another level, and will drive a cross-cut tunnel from the lower level of the Wingate, or No. 1, to tap what is known as the Miller vein. The Great Western Coal Company, of Tenino, has made railroad connection with the Northern Pacific Railway; a bunker has been erected and a washer is now being installed. The company will sink a shaft this year to open two underlying veins of coal. The South Prairie Coal Company is to adopt electric power for haulage, pumping, etc. The Gale Creek Coal Company has built 25 coke ovens, installed a washing plant and made new openings. The Snoqualmie Coal & Coke Company will produce coal from three openings; a bunker will be built and electric and washer plants installed. The Crescent and Summit coal companies will help to increase the tonnage for 1904.

The prospects are very promising for an increase in output during the present year of at least a half million tons. The resumption of the tariff on foreign coals will, without doubt, have a favorable effect on export shipments.

THE ROLL-JAW CRUSHER.

In order to explain more clearly the action of the roll-jaw crusher, made by the Sturtevant Mill Company, of Boston, illustrations of which were given in the JOURNAL of January 21, we give herewith a sectional view of the crusher, which illustrates the construction and action of the machine. The roll-jaw crusher, it will be seen, has one stationary jaw, and opposite this a long lever jaw backed by toggles is supported and rocked by a pitman connected with an eccentric driving shaft. The rocking jaw face has a perfect roll upon material caught between the jaws. The moving jaw does not advance and recede, although ap-



THE ROLL-JAW CRUSHER.

pearing to do so. The jaws always remain at a fixed distance apart. There is no rubbing action whatever.

These machines do not clog because the roll jaw face rolls over the rock, which drops out after the crushing jaw has passed over it. This jaw is a long, powerful lever, and its force is multiplied by the back toggles. They are intended, in fact, to do the work ordinarily performed by a rock-breaker and a pair of roughing rolls.

ABSTRACTS OF OFFICIAL REPORTS.

General Chemical Company.

The report of this company, just issued, covers the year ending December 31, 1903. The financial statement for the year compares with that for 1902 as follows:

	1902.	1903.
Net earnings	$1,507,551	$1,187,076
Accounts charged off	269,143	215,978
Balance	$1,238,408	$971,098
Dividends paid	861,372	970,515
Surplus	$377,036	$583
Brought forward from previous year	1,238,437	1,615,473
Total surplus	$1,615,473	$1,616,056

Dividends paid in 1903 were $600,000 on preferred and $370,515 on common stock, a total of $970,515. The report states that during the year there was expended for new construction $570,606; for repairs and reconstruction, charged to expenses, $443,870. President William H. Nichols, in his address to stockholders, says:

"Results for the year 1903 have not borne out the anticipations of the directors. The causes have been many and varying. Of course, the most important one is found in the general business condition of the country, arising from labor difficulties, collapse in many industries, and cautious conservatism in others, resulting in curtailment in consumption which in some quarters has been very marked.

"In addition to unfavorable trade conditions, we have lost one factory by fire, and have suffered greatly from the extraordinary floods of last October."

QUICKSILVER PRODUCTION IN EUROPE.—A recent communication from Vincent Spirek, of Santa Fiora, Italy, gives the production of quicksilver in 1903 as follows, in metric tons: Spain, 930; Austria, 520; Italy, 270; total, 1,720 tons. The output of the Spanish mines shows a marked falling off from the production in 1902, while the output of Austria and Italy increased slightly.

ASPHALT LANDS IN INDIAN TERRITORY.—The Tishomingo (Indian Territory) folio, which the United States Geological Survey has now ready for distribution, will be of interest to people seeking investment in asphaltic deposits. Of the 7,239 acres of asphalt land segregated from the possessions of the Choctaw and Chickasaw nations and destined for sale at public auction less than a year hence, about 2,160 acres lie in the Tishomingo quadrangle. It will be remembered that the United States made a treaty with the Choctaw and Chickasaw tribes on March 21, 1902, in accordance with which all deposits of coal and asphalt on their lands were to be sold at the expiration of two years after the final ratification of the treaty.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

State of Connecticut. Report of Storrs Agricultural Experiment Station, 1903. Middletown, Conn.; State Printers. Pages, 202; illustrated.

Massachusetts. Thirty-fourth Annual Report of the State Board of Health. Samuel W. Abbott, Secretary. Boston, Mass.; State Printer. Pages, 624.

Map of South Africa; Corrected to 1904. London, England; published by *South Africa.* Price, in New York, folded and in cover, 35 cents; mounted on cloth, 85 cents.

Twenty Years' Railway Statistics, 1883-1903. Prepared by Frederick C. Mathieson & Sons. London, England; Effingham Wilson. Pocket-size, 196 pages. Price in New York, 35 cents.

Statistical Year-Book of the Kingdom of Norway, 1903. *Twenty-third Year.* Prepared by the Central Statistical Bureau. Kristiania, Norway: H. Aschehoug & Co. Pages, 172.

Mineral Resources of Kansas, 1902. Prepared for the University Geological Survey. By Erasmus Haworth, State Geologist. Lawrence, Kansas; published by the Survey. Pages, 136; with maps and illustrations.

Getting a Living. The Problem of Wealth and Poverty, of Profits, Wages and Trade Unionism. By George L. Bolen. New York; the Macmillan Company. London; Macmillan & Company, Ltd. Pages, 770. Price, $2 net.

Mathieson's Hand-Book for Investors for 1904. Prepared by Frederick C. Mathieson & Sons. London, England; Effingham Wilson. Pocket-size, 312 pages; with dividend supplement, 116 pages. Price in New York, 85 cents.

United States Fish Commission. Bulletin 546. *Shore Fishes Collected about the Hawaiian Islands.* By John O. Snyder. Pages, 26; with 13 plates. *Bulletin* 547. *Fishes Collected in the Tortugas.* By David Starr Jordan. Pages, 6; with two plates. Washington; Government Printing Office.

BOOKS REVIEWED.

A New and Abridged Method of Finding the Locus of Geographical Position and the Compass Error. By G. W. Littlehales. Washington, 1903; published by the Philosophical Society of Washington. Pages, 14; with diagrams.

The paper describes a method for determining latitude and longitude lately introduced among navigators and known as the 'new navigation.'

Register of Mines and Minerals—Amador County, California. San Francisco. Issued by the State Mining Bureau; Lewis E. Aubury, State Mineralogist. Pages, 12; with map.

This pamphlet is one of a series, issued by the California State Mining Bureau, which is intended to furnish a complete register of the different gold mines, mills and arrastras in the State, and of the other minerals mined or commercially utilized. The information is arranged in tabular form, so that any desired data can be found without trouble. Accompanying the pamphlet is a map of the county showing the geological formations and the mineral locations. These publications are very useful, and render material assistance in developing the mineral resources of the State.

United States Geological Survey Monographs, Volume XLV. The Vermilion Iron-bearing District of Minnesota. By J. Morgan Clements. Washington; Government Printing Office. Pages, 464; with an atlas and illustrations.

The ancient rock formations that stretch along the Height of Land from Labrador to the Mississippi river furnish some of the most baffling stratigraphical problems that geologists have tried to solve. Much of the region is sparsely inhabited and is forest-clad; glacial detritus covers wide areas, and the formations themselves consist of sedimentary rocks, volcanic flows and igneous intrusions, often tightly folded and profoundly metamorphosed. Thus there is great difficulty in correlating rock-horizons in the same district, to say nothing of districts miles apart. Difficult as the task of classification is naturally, it has been rendered still harder by the mistaken activity of various geologists.

Every beginner in geology to-day is taught that the proper way, the honest way, of geological mapping, especially in hasty work on areas where the stratigraphy is at all complex, is to put down what is actually seen, and to indicate the probable but unseen. Afterward there is time to classify different formations. Unfortunately, too many geologists, who have worked at pre-Cambrian problems in this country and in Canada, have gone on the principle of quantity rather than quality. Maps have been published with vast areas colored in when the geologists perhaps saw few exposures and sometimes failed to make an honest attempt to determine such fundamental points as the strike and dip of the beds. Confusing cleavage and schistosity with stratification, they did not trace out accurately the structural relations of the rocks in some restricted area, so that they could have had a basis on which to work, and they sometimes confused igneous and sedimentary rocks, where ordinarily painstaking work should have shown the difference. On the basis of such hasty and careless field observations they made broad generalizations, and their schemes of classification contain absurd and fantastic names, sometimes correlating formations hundreds of miles apart by a fancied lithologic resemblance. There would be more excuse for such slipshod observation and illogical deduction had not the late Major Brooks, in his report on the Marquette range 30 years ago, showed what can be done by care and hard work with an absurdly small State appropriation.

The final result is that one can find, in the reports of the same geologists, a rock series classified under at least three different schemes; while, for such a practical question as the possible origin of certain iron ores, the same geologists have at various times put themselves on record as favoring at least three different origins, some clearly nothing but wild guesses; but, having covered both the probable and improbable, they are in a position to say "I told you so" to later and more careful investigators.

Probably the first serious attempt to work out in detail the complicated stratigraphy of the important part of the Vermilion range in Minnesota was made by Smyth and Finlay in 1895. They found pitching anticlines and synclines. Some previously published bulky compilations of field notes had shown few more definite ideas of stratigraphic relations about Vermilion lake than the suggestion of a simple syncline with a total thickness of strata of some 106,000 ft. Smyth and Finlay pointed out the structural relations of the ore-deposits at Tower and Ely, but they confused certain true conglomerates and certain pseudo-conglomerates, and this error seriously impaired the value of their views on the stratigraphy.

The present volume is a long step in advance. It contains the results of careful observations in the field, with detailed mapping. These field observations were afterward correlated with the information obtained from the microscopic study of selected specimens in the laboratory. The atlas accompanying the report contains maps, which, as the author says, may need slight revision in certain areas, owing to their small scale; but it is probably safe to say that they are the first published maps of the Vermilion range that have real value. The author was fortunate in having at his disposal the results of previous investigators and of a private survey made by Mr. W. N. Merriam for the Minnesota Iron Company.

The report gives a general description of the district, its situation, topography, etc.; a résumé of what has been written by previous geologists, a discussion of the various rock-formations in detail, paying particular attention to the iron-bearing formation, and concludes with a discussion of the relation of the topography to the geological structure and a brief geological history of the district.

The most noteworthy statement, as regards the general classification of the rock horizons, is that made on page 129, in which the author states that, as a result of the field-work done in 1900, Professor Van Hise has modified his ideas of the Archean; formerly he supposed it to be composed of igneous rocks only. Now the term Archean is applied to rocks older than the Algonkian, predominantly of igneous origin, but also including some subordinate amounts of sediments. The author gives the following stratigraphical succession in the Vermilion district, in descending order: Pleistocene, glacial drift; Keweenawan, Duluth gabbro and Logan sills; (Unconformity); Upper Huronian or Animikie series, confined largely to the east end of the district and including the Rove slate and Gunflint iron-bearing formation; Lower Huronian, including granite, granite-porphyry and dolerite intrusives, the Knife Lake slates, Agawa iron-bearing formation and the Ogishke conglomerate; (Unconformity); Archean, intrusive granites and granite-porphyries, the Soudan iron-bearing formation and the Ely greenstone, the last a basic igneous rock, partly a surface flow.

It will be seen at once that this scheme places the important Soudan iron-bearing formation in the Archean. Certain geologists had previously proposed putting this formation there, but their conclusions were largely guesswork, as is shown by their including in the Archean everything below the Animikie. It will also be seen that the author has adopted local names for rock series in accordance with the general plan of the United States Geological Survey, but rejects those far-fetched terms which some geologists have seen fit to use.

Taken as a whole, the report is notable for its admirable clearness of style and exactness in the use of terms. It is no mere list of rock outcrops or undigested summary of field notes. On the contrary, accounts of the various localities are admirably concise, while the theories propounded to account for stratigraphical relations, for metamorphic changes and for the origin of the iron ores will appeal to any person of sense. For instance, the author rejects the hypothesis that thin bands of ore and jasper, such as are characteristic of the iron formation, could have been formed as chemical precipitates in an alkaline ocean. The author also wisely refrains from giving estimates of thickness of certain formations, since, owing to the complicated folding, such estimates cannot be made from the data now available. However subsequent observers may modify the mapping in certain areas, they will hardly be able to upset the essential features of Mr. Clements' conclusions, and the report will undoubtedly remain a most helpful guide to land-owners, mining companies and explorers in the Vermilion district, and a noteworthy contribution to the literature on pre-Cambrian stratigraphy.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the EDITOR.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Pyrites Used in Colorado.

Sir.—We notice in your issue of January 21 an article on 'Pyrite,' in which appears the following statement: "There was no reported production of pyrites for acid manufacture in Colorado." This would probably lead some of your readers to imagine that no pyrites were consumed in this State for the above purpose. For your information, we would say that our company last year used 7,851 tons of pyrites for the manufacture of sulphuric acid.

WESTERN CHEMICAL MFG. CO.,
Per R. B. Hosker, Secretary.

Denver, Colo., Jan. 27, 1904.

Analysis of Radio-active Minerals.

Sir.—In view of the popular and scientific interest which is at present taken in radium and other radio-active elements, I trust that you will be so kind as to publish this communication in the columns of your JOURNAL.

The purpose of this note is to inform your readers that I will gladly test for radio-activity any samples of material which they may care to send me, and will furnish them with a brief report on the results of the examination. Where the degree of radio-activity of a given sample is sufficiently high to warrant a more elaborate investigation and the quantity of material is sufficient I will, if desired, further, make a qualitative chemical examination of the sample to determine whether it contains radium, polonium or actinium. For such an examination and report I shall make no charge whatever, the only requirement being that the samples are to be delivered by mail or by prepaid express at the address given below.

For a simple test for radio-activity a small fragment not larger than a copper cent is all that is necessary, and for a qualitative chemical examination the amount required is generally not more than a couple of ounces. Where it is desired by the sender to preserve the specimen for cabinet or other purposes it is perfectly practical to test it with respect to its radio-activity without injuring the sample in any way.

Contrary to the general belief in this matter, the carrying out of an examination similar to that described above is neither a very difficult nor a very tedious operation.

BERTRAM B. BOLTWOOD.

No. 139 Orange Street, New Haven, Conn., Jan. 30, 1904.

A System for Filing Current Information.

Sir.—The dissatisfaction with the method of keeping complete files of technical journals and of searching for information by means of the ordinary index, as expressed by a recent correspondent of the JOURNAL, has, no doubt, been felt by many engineers. A system of filing and classifying technical articles which would combine compactness with accessibility would save time and annoyance in getting at information, and would therefore be of value to the practicing engineer. Without doubt, there are in use many systems designed to dispense with the "complete file." The system about to be described is the outgrowth of the trial of several different methods, and has rendered very satisfactory service for some four years. No claim for originality is made for it, as it is only an adaptation of the card system of filing.

The unit of the system is a 6¼ by 3½-in. heavy manila envelope and a card of corresponding size. Tab-cards of different colors furnish the means of indexing. All articles which are to be filed are clipped, margins trimmed off, folded compactly and placed in an envelope. On the upper left-hand corner of the envelope is placed the classification scheme, in the middle the title of the clipping, name of the journal and date. The envelope, thus marked, is filed in a card-filing cabinet according to any classification which best meets the needs of the user. Continued articles are filed in the same envelope until that becomes too bulky, when another is used and marked No. 2.

Fig. 1 shows an example of envelope to be used for this purpose.

Where two articles occur on the same clipping and it is desired to save both, or where a single article can be referred to two or more subjects in the classification scheme, the article which is considered of the most value has its subject upon the envelope, and the other article is given a reference card which refers to the clipping and gives the subject and classification scheme under which the clipping may be found. Fig. 2 illustrates this.

Where an article is divided on two clippings a reference, together with title and classification scheme, is made on the envelope to the other, in which the remainder of the clipping is to be found. Fig. 3 illustrates this point.

The classification scheme indicates the main parts of the subject arranged in logical sequence; the subdivisions are arranged accord-

ing to the same method, or alphabetically, or in any way that convenience dictates. Where there are many subdivisions, the writer has found the alphabetical method the best. The principal and other subdivisions suggest themselves from the subjects of the articles falling under one head. The following main heads, given in the order of their arrangement, are used: Chemistry, Metallurgy, Geology, Mining Districts, Mining, Engineering and Statistical. The extent of the subdivision is best illustrated by an example:

Cyanide Process:
- General and miscellaneous,
- Chemistry of,
- Control and administration,
- Cost of,
- Cyaniding difficult ores,
- Examples of cyanide practice,
- Extraction—leaching,
- Plant { General description, / Details of constr. and equip.
- Processes { Patented, / Modifications of cyanide,
- Precipitation { Zinc thread, / Charcoal, / Electrical, / Miscellaneous,
- Preliminary treatment { Crushing, / Roasting, / Vat,
- Refining precipitate,
- Slimes treatment,
- Testing ores.

Provision is made under each main subdivision for a general and miscellaneous group.

In addition to filing clippings, private notes, sketches and abstracts are made on the cards and classified along with, and under, the same classification scheme.

Mining
Mine-sampling

The sampling and estimation of ore in a mine.

E.& M.Journal

Sept.5,12,19,26, 1903.

FIG. 1.

Mining
Drilling
Electric drill
Use of

See official Report of the Liberty Bell Gold Mining Co.

E.& M. Journal,May 30,1903.
See—Mining-company reports-gold mining co.

FIG. 2.

Mining
Examination and prospecting

Test drilling on the Vermillion Iron Range.

E.& M. Journal,Jun 27,1903.

Continued on the back of——The Determination of Sulphur in Coal:

See Chemistry-determinations.

FIG. 3.

Under the general classification scheme indicated above, the writer has found the average number of cards and envelopes required for a single issue of the JOURNAL to be from six to eight, while the total time required per month, exclusive of time for reading, for the clipping and classifying of the more important articles in four weekly engineering papers is from 4 to 6 hours.

Simplicity and compactness are inherent in the card system. The adaptation of this system to the filing of current engineering and related information places the information under any subject together and ready for immediate use.

GEORGE J. YOUNG.

Reno, Nev., Jan. 29, 1904.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Repairing Steel Tape.—Will you kindly describe a good method for repairing a broken steel tape? I have tried brazing several times, but the results were not wholly successful.—I. J. S.

Answer.—We are unable to find any information bearing on this question. Perhaps some of our readers have had experience in this line, and we shall be glad to hear from anyone who can give the desired information.

Silver Ore.—What would, under normal conditions, be the best treatment for a silver ore containing 25 oz. Ag per ton; nature of ore: 1. Hard silica rock. 2. Pulverized iron oxide?—A. E.

Answer.—On the face of it, your ore is thoroughly docile; it could either be treated by pan amalgamation or, if limestone is procurable, by direct smelting. It is hardly likely, however, that your ore contains only silica and iron oxide. How about alumina, barite, etc.?

Paint Rock.—A short time ago I was shown a piece of soft, slaty, light-reddish colored rock, which the possessor told me was used in the manufacture of paint as a substitute for red lead. He called it paint rock. Is such a rock used in this way, and, if so, is there much trade in it? What is its probable value per ton?—H. T. C.

Answer.—The material you describe is probably an impure iron ore, of the nature of hematite. Such ore, when possessing a good color, is ground and sold as iron oxide pigment, sometimes under the name of Venetian red. It is used for inferior purposes, and cannot be said to be a substitute for red lead, which is a high-grade pigment. The crude material from which iron oxide paint is made has only a nominal value; the ground product commonly sells at about $10 per ton.

Platinum.—Can you give me some information about platinum, its color, appearance and general characteristics, when found in gold placers?—J. R. C.

Answer.—Platinum is a malleable metal, silvery-white to steel-gray in color, and is somewhat harder than native silver. It is infusible except at very high temperature, which can be obtained only with the oxy-hydrogen flame or electric arc, and is very resistant to ordinary acids. The principal sources of the metal are alluvial deposits or placers, where it sometimes occurs in association with gold, but more frequently with the mineral chromite. Like gold, it is usually found in small grains and scales or larger nuggets of irregular form. The smaller particles sometimes show magnetic properties, owing to the presence of iron. The color, malleability, high specific gravity (16 to 18) and insolubility in acids serve as means for readily distinguishing platinum, whether occurring alone or in association with other metals.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

SITUS OF ACTION IN FORECLOSURE ON MINING PROPERTY IN UTAH.—The laws of Utah (Revised Statutes, 1898, section 3498) provide that there can be but one action for the recovery of a debt or the enforcement of any right secured by mortgage; and section 2928 declares that actions for the foreclosure of all liens and mortgages on real property shall be tried in the county in which the subject of the action is situated; therefore, an action to foreclose a mortgage and certain liens on a mining claim was properly brought in the county where the claim was situated.—Fields v. Daisy Gold Mining Company (73 *Pacific Reporter*, 521); Supreme Court of Utah.

NOT THE AMOUNT PAID, BUT THE VALUE OF ASSESSMENT WORK DETERMINATIVE.—Where, in an action to quiet title to a mining claim, the only evidence as to the assessment work of the parties claiming prior location was that of two witnesses who testified that they believed or were of the impression that they worked 15 or 16 days each, but kept no memorandum of the time, and that such work was worth at least $100, but on cross-examination they could not give the date when they commenced or quit work, and were uncertain as to the number of days of their service, and other witnesses testified that such men worked but nine days, though they had been paid $108.50 for the work, it was held that a finding that such work was not greater than $50 was proper, and the property was subject to re-location.—Wagner v. Dorris (73 *Pacific Reporter*, 318); Supreme Court of Oregon.

ROYALTIES AND DAMAGES UNDER A COAL LEASE.—Where a company executed a coal lease, by which it covenanted to pay a royalty of 10 cents a ton on all coal mined and shipped, and except under certain conditions to mine after the first year not less than 75,000 tons per annum, and as much more as practicable, paying royalties on the quantity named, whether mined or not, the royalty paid on coal mined in any year to be credited on the excess, if any, above the minimum mined subsequently, and after the first year the lessee abandoned the mine, the lessor on the expiration of the time covered by the lease was entitled to recover for the whole period the minimum royalty specified and interest.—Berwind-White Coal Mining Company v. Martin (124 *Federal Reporter*, 313); United States Circuit Court of Appeals.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending February 2, 1904.

750,824. PROCESS OF PRODUCING PIERCED INGOTS WITH SOLID ENDS.—Leonard D. Davis, Erie, Pa. A method of producing a pierced metallic ingot with a solid end, which consists in previously shaping the ingot with the portion to be closed of smaller diameter than the body of the ingot, passing the ingot through a piercing-mill arranged to apply pressure rotatively on the ingot and to feed the ingot upon the piercing-mandrel, the size of the reduced portion being such relatively to the pass of the mill as to prevent an actuating engagement of the reduced portion by the mill.

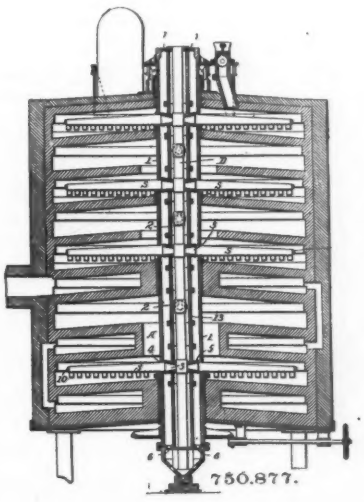
750,840. WELL-DRILL.—Christopher C. Fox, Higginsville, Mo. A well-drill comprising an open-ended bucket, a frame fixed in the bucket, a hollow shaft journaled in the frame concentric with the bucket, a bit fixed to the lower end of the shaft below the bucket and having dirt-passages through its central portion, a second shaft passed through the hollow shaft and projecting from both ends thereof, a second bit attached to the second shaft below the first bit, said bits being formed to cut when rotated oppositely, and means for rotating the bits in opposite directions.

750,846. CENTRIFUGAL PUMP.—Thomas R. Goth, San Francisco, Cal. In a centrifugal pump, a pump-casing, a rotary runner inclosed thereby, suction and discharge pipes connecting with said casing, a water-chamber communicating with said casing, and an inclined rotary pressure device within said water-chamber, adapted to act positively against the water therein.

750,864. ADJUSTING MECHANISM FOR ROLLS, ETC.—Paul Knecht, Knoxville, Pa., assignor to A. Garrison Foundry Company. In combination, a roll, a frame carrying the same, screws for adjusting the frame, a bridge connecting the screws, and means between the bridge and the frame for holding the screws and the frame in constant contact, whereby the wear between the frame and the screws will be taken up automatically and as fast as it takes place.

750,868. FURNACE.—Philip A. MacKay, Wenona, and William E. Moore, Peru, Ill. In a furnace construction, the combination with two regenerators, one placed above the other, of a passage-way affording communication between the regenerators for conveying the products of combustion of either to the other to heat such other, said passage-way including a chamber adapted to contain matter to be subject to the action of heat.

750,877. ROASTING-FURNACE.—August R. Meyer, Kansas City, Mo. A shaft having inner and outer



concentric sections with coinciding sockets, combined with radial arms having stems fitting said coinciding sockets, and means for retaining the parts in connection.

750,886. BUCKET CONVEYER.—Charles H. Notter, Chicago, Ill. In combination, an endless conveyer-chain movably supported; a driving means for said chain; a series of buckets pivotally supported on said chain, each bucket overlapping the next adjacent bucket on one side thereof; and stationary means engaged by said buckets for tilting the buckets to clear their overlapping edges at points where the conveyer-chain changes its direction of travel.

750,895. GRINDING-MILL.—Aaron J. Robinson, Fremont, N. H. A grinding-mill comprising a divided main shaft, grinding-disks thereon rotating in opposition to each other, a casing inclosing said disks, a feed-spout arranged at one side of the casing and adapted to discharge into the grinding-space between the disks, and an adjustable deflector located within the feed-spout between the hopper and opening of grinding-disk, and adapted to divert a portion of the material passing through the spout and deliver the same unground to a point beyond the action of the grinding-disks where it may be conducted to the usual screen or bolt.

750,899. KILN.—Charles Schweizer, Maplewood, Mass. A kiln for burning fire-clay goods, comprising inner and outer walls with a space between, combustion-chambers at opposite sides, each combustion-chamber opening into a vertical flue which opens at its lower end into a horizontal flue across the bottom of the oven, which horizontal flue opens into the lower end of a vertical flue against the furnace on the opposite side, whereby additional heat is given to the products of combustion as they ascend along the sides of the oven, the vertical flues discharging at or above the top of the oven.

750,905. ARTIFICIAL SLATE.—James T. South, Brighton, England. A composition for the manufacture of artificial slate consisting of a mixture of portland cement, with red oxide of iron, blue-black and permanganate of potash.

750,949. APPARATUS FOR USE IN THE MANUFACTURE OF ARTIFICIAL STONE, ETC. William A. Darrow and Albert C. Wood, Philadelphia, Pa., and John R. Allen, Merchantville, N. J. The combination of a screw conveyer adapted for feeding lime at a definite rate, with a screw conveyer adapted for feeding sand at a definite rate, a screw conveyer adapted for receiving and mixing lime and sand discharged thereto by said first conveyers, and a revolving mixer having inwardly-projecting members for receiving the discharge from said last-named conveyers.

751,014. ROTARY PUMP, BLOWER, ETC.—Carl Rein, Hanover-List, Germany. In a rotary pump, a cylinder having an inlet branch, an outlet branch, and a bridge terminating in a rounded abutment intermediate said branches, combined with an eccentric rotatable piston, a surrounding strap, and a valve on the strap which is adapted to project beyond the abutment and to impinge against the same at one face, while the other face of the valve is free.

751,078. WELL-DERRICK.—Jacob C. Knupp, Warren, Pa. In a derrick, a base comprising sills and cross-pieces resting upon and connecting said sills, upwardly-converging uprights rising from the central cross-braces, inclined braces connecting said uprights with the sills exteriorly adjacent to the outer cross-braces, horizontal braces connecting said inclined braces at the sides and at the rear end of the derrick, an inclined brace connecting the rear horizontal brace with the proximate cross-brace upon the sills, and uprights framed and supported upon the rear cross-pieces and connected at their upper ends with the rear horizontal brace and forming supports for the shaft of the bull-wheel.

751,080. MANUFACTURE OF FIREPROOF BRICKS OR MATERIAL.—Friedrich Krüger, Berlin, Germany. A process for manufacturing fireproof stones, bricks, blocks or material consisting in adding a mixture of finely-ground waste of marienglass or other unburnt gypsum ($CaSO_4$) and a small proportion of finely-ground asbestos or soapstone to a heated liquid mass of silicate of soda or of potassium (Na_2SiO_3 or K_2SiO_3) and mixing the whole until a thoroughly homogeneous plastic mass is obtained, charging molds with them and heating them to a red heat.

751,085. APPARATUS FOR THE MANUFACTURE OF GAS.—Leon P. Lowe, San Francisco, Cal. A shell having a mediate combustion-chamber nearer to one end of said shell than the other, loosely-piled refractory material between said chamber and each end of the shell, means for feeding fluid hydrocarbonaceous material and air into said combustion-chamber, flues leading from both ends of the shell whereby the products of combustion in said chamber are led in both directions through the shell, a steam-supply pipe at the end of the shell nearer the combustion-chamber, and a gas-outlet at the other end of the shell.

751,089. METHOD OF MAKING CONCRETE BUILDING BLOCKS.—Frederick A. Malette, Geneva, N. Y. A method of making concrete building-blocks and the like, which consists in coating the individual stones with mortar, subjecting a mass of the stones thus coated to compression and simultaneously molding said mass into proper shape, whereby the stones are bonded together independent of the action of the mortar and without filling the spaces or voids between them, beneath the surface of the mass, and afterward pouring a thin mortar onto the mass and allowing it to flow down into the voids between the stones and partially fill the same.

751,100. ELECTROMAGNETIC ORE-SEPARATOR.—Ellen M. Oviatt and Alexander Dean, Denver, Colo. A magnetic ore-separator comprising a pair

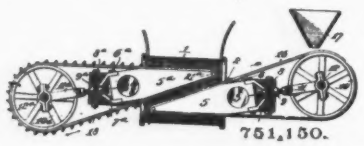
of electromagnets each having a north and a south pole and a fixed coil, each pole of each magnet being arranged adjacent to the pole of opposite polarity of the other magnet, producing an induced current through both magnets, a plurality of revoluble pole members within the magnetic circuit of said magnets, and means rotating said members.

751,108. TUBE-MAKING MACHINERY.—Vernon Royle, Paterson, N. J. The combination with a main support and a die-block, of a ring arranged to clamp the die-block to the main support, the said die-block being seated within and supported by the said ring independently of the clamping action of the ring.

751,133. APPARATUS FOR PREPARING PULVERULENT MATERIALS FOR MOLDING OR BRIQUETING.—Ellsworth B. A. Zwoyer and Rolland A. Zwoyer, Hoboken, N. J., assignors to the Zwoyer Fuel Company, New York, N. Y. In apparatus for preparing pulverulent material for molding or briqueting, the combination of means for maintaining the pulverulent material with its particles in a suspended or separated condition, and means for passing a binder in a finely-divided form through such suspended pulverulent material.

751,134. PROCESS OF PREPARING PULVERULENT MATERIALS FOR MOLDING OR BRIQUETING.—Ellsworth B. A. Zwoyer and Rolland A. Zwoyer, Hoboken, N. J., assignors to the Zwoyer Fuel Company, New York, N. Y. The process of mixing a binder with pulverulent material, consisting in adding the binder in a finely-divided form to such material when the particles of the material are maintained in a suspended or separated condition.

751,150. ELECTROMAGNETIC ORE-SEPARATOR.—Alexander Dean, Denver, Colo. The combination



751,150.

with a pair of adjustable pole members, of belts for the pole members, drums for the belts adjustable with the poles, and adjustable connections between the poles and the drums.

751,172. ARTIFICIAL FUEL.—George T. Howard, Lagrange, Ill., assignor of one-half to William J. Applegate, Chicago, Ill. A composition for artificial fuel consisting of the following ingredients in substantially the proportions stated: Loam, 55 parts; coal-screenings, 25 parts; sawdust, 5 parts; petroleum, 3 parts; oil-meal, 3 parts; paraffin, 1 part; milk of lime, 3 parts; solution of glue, 1 part, and tar, 4 parts.

751,180. PROCESS OF MAKING DIAMOND DRAW-PLATES.—Friedrich Krause, Jersey City, N. J. A process of making diamond draw-plates, which consists in boring a small recess in line with the central axis of the stone, then supporting it in a mould at diametrically opposite points, said points being arranged in the line connecting the central axis with the recess, then casting metal around the stone with the exception of the part forming the recess, then removing the stone with the incasing metal from the mould after the metal has cooled, and then drilling a hole through the stone in line with the recess and the central axis of the stone.

751,187. APPARATUS FOR CONDENSING AND BLEACHING OILS.—Stanislaw Lewiak, Warsaw, Russia. The combination of a boiler composed of inner and outer shells or casings, means for admitting a heating medium to the space between said casings, an air-pipe arranged within said space and adapted to discharge the heated air into the inner casing, and an agitating device arranged within the inner casing.

751,196. ROTARY PUMP.—Jens Nielsen, Cedar Falls, Iowa. A casing having an intermediate partition dividing the interior of the casing into a pair of circular intersecting chambers, a pair of revoluble intermeshing pumping members disposed one in each of said chambers, and supporting-shafts for said members, each of the shafts having a bearing in the partition.

751,199. WELL DRILL-JAR.—George B. Patton, Williamstown, W. Va.—A device comprising a shell, a bushing secured in one end of the shell, a screw-plug having an inner tempered end fitting in the opposite end of the shell, a plunger working in the shell through said bushing, and a removable cap secured to the inner end of the plunger.

751,225. DUMPING-ELEVATOR.—Franklin B. Van Cleave, Echo, Ore. The combination with a supporting-frame and a tilting bucket, of locking mechanism for the bucket, tripping mechanism for the locking mechanism, guides with which the bucket coacts when it is tilted, and an actuator for the tripping mechanism having an arm secured to the guides and to the supporting-frame.

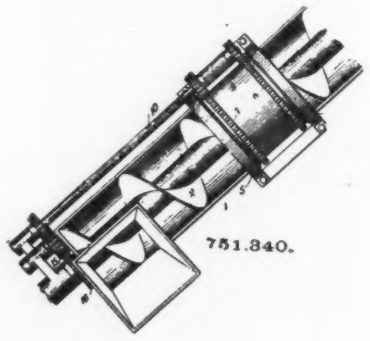
751,280. AGGLOMERATING COMPOUND FOR AGGLOMERATING PULVERULENT MATERIALS.—Calocero Giglio and Bachir Zaouche, Paris, France. An agglomerating compound for the afglomeration of all pulverulent material, consisting of the following ingredients mixed together in adequate proportions: torrefied potato fecula, common gas-pitch, acetic acid, tallow, common glue and Turkish glue.

751,287. TUNNEL CONSTRUCTION.—Jesse L. Holmes, Butte, Mont. A structure for forming tunnels comprising side, top and bottom walls of metal formed in sections, partitions extended lengthwise of the sections, partitions extended transversely of the sections thus forming water-tight compartments, means for controlling the admission of water to the compartments, and means for discharging water therefrom.

751,289. TUNNEL-BAR.—George W. Jackson, Chicago, Ill. In a tunneling device, the combination with a frame, of a tunnel-bar, four independently-adjustable supports for said bar mounted on said frame, said supports controlling the angle of the incline of said bar, and supports for holding the frame in position.

751,311. CHUCK FOR ROCK-DRILLING MACHINES. — Leonard Leigh, Jr., Luipaardsvlei, Transvaal. A rock-drill chuck comprising a head or main portion constructed with an internal longitudinally-tapered cavity and a correspondingly-tapered bush split for a portion of its length to form a plurality of compressible jaws constructed to embrace the shank of the drill between said jaws, and made solid or closed at the inner and smaller end to form a stop or abutment to be engaged by the extremity of the drill-shank so that the bush is forced into the head by the drill, and the jaws thereby compressed to grip and secure the drill.

751,340. ORE-SAMPLING MACHINE.—William L. Raht, Salt Lake City, Utah. In an ore-sampling



751,340.

machine, a rotary chute member having an opening between its ends, and means for causing the discharge of material through said opening at intervals.

751,350. PROCESS OF PRODUCING HEAT FROM FUEL.—Joseph M. Schutz, Minneapolis, Minn. A process of burning fuel, that consists in mixing the pulverized fuel with air, creating therefrom a hollow cylinder of fuel-laden air in rapid rotation, confining the same, and applying heat to the exterior thereof to liberate the gases of the fuel and to ignite the gas.

751,396. BUCKET ELEVATOR AND CONVEYER.—Frederic V. Hetzel, Philadelphia, Pa., assignor to the Link Belt Engineering Company, Philadelphia, Pa. The combination, in a bucket elevator and conveyer, of a trough, a chain having links, a bucket secured to one of the links of the chain at such point that when the bucket reaches the head of the vertical runway, it will have an extended lateral movement over the trough before tipping to such a degree as to discharge some of the material carried thereby.

751,399. PROCESS OF RECLAIMING FLUE-DUST.—Guy R. Johnson, Chicago, Ill. A process of reclaiming flue-dust, which consists in mixing the same with salt, then subjecting the mixture to heat to fuse the salt and the metallic particles in the flue-dust into a compact mass, and subjecting the heated mixture to agitation to form the mass into lumps.

751,401. METHOD OF TREATING REFRACTORY ORES.—Edward H. Miller, London, England. A process for the treatment of refractory lead-zinc ores consisting in mixing the ore with silicious matter and pitch, with the addition of lime according to the silver value of the ore, forming the mixture into dry blocks, packing the blocks in a furnace with suitable air-spaces, and sprinkling the layers with lime and gradually raising the temperature, whereby substantially the whole zinc content of the ore is converted into metallic zinc which distills over, and the lead and silver contents of the ore are also converted into the metallic state, in which state they are retained in the residue in the retort and recovered therefrom by melting out.

751,424. CONCENTRATOR.—Henry Wismeyer, Emporia, Kan. A concentrator comprising a distributing-chamber, a separator and grader having a series of compartments and pockets, a series of conductors arranged intermediately of said distributor and grader and composed of a series of concentric tubes which are permeable to air and graded in mesh as described, the inner tube alone communicating with the distributor and the other tubes being closed at the top and communicating separately with the respective compartments of the grader.

751,425. COMBINED GOLD SEPARATOR AND AMALGAMATOR.—Henry Wismeyer, Emporia, Kan. A combined gold separator and amalgamator comprising the rotary separator proper consisting of a series of graded perforated concentric cylinders, a like series of conductors into which said cylinders respectively discharge, two riffle-plates arranged in the lower portion of the machine and receiving material from two of said conductors, a series of inclined amalgamating-plates arranged at an angle to each other and interposed between the separator and riffle-plates and supported in the same reciprocable frame with the latter, and a fan located above the separator.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending January 23, 1904.

20,465 of 1902. TREATING LEAD-ZINC SULPHIDES.—E. H. Miller, London. Mixing lead-zinc sulphides with sand and pitch, making into briquettes, heating in retort with lime, the sulphur being driven off first and the zinc distilled over afterwards.

26,295 and 26,296 of 1902. SEPARATING ORES.—A. E. Cattermole, London. Separating ores from gangue by first immersing in an emulsion of oil, soap and water, the proportion of oil being very small, so that the metallic particles do not float, but sink with the gangue, and afterwards separating the metallic particles of mechanical classifiers.

27,990 of 1902. WORKING MINE DOORS.—M. Dreckmann and E. Marx, Essen, Germany. Improved method of automatically opening and closing the doors in mines.

28,178 of 1902. PURIFYING STEEL.—C. Koller, Salgotarjan, Hungary. Separating oxide from molten steel by submitting it to centrifugal action in a separator.

1,562 of 1903. STEEL MAKING.—J. Baxeres de Alzugaray, London. Making refined steel direct from ores by making the ground ores into briquettes with coke, lime, fluorspar, common salt and slag, and smelting.

2,645 of 1903. CRUSHING ROLLS.—T. A. Edison, New York, U. S. A. Improved method of mounting the inventor's dry crushing rolls.

4,263 of 1903. ROCK DRILL EXHAUST.—Duisburger Machinenbau A. G. Duisburg, Germany. A chamber for deadening the exhaust of rock drills so as to decrease the noise and prevent the formation of clouds of dust.

5,016 of 1903. ROASTING BLENDE.—A. Kunze and K. Danziger, Kallowitz, Germany. Roasting mixed blende and pyrite in such a way that the pyrite oxidizes before the blende, then removing the iron by leaching, after which the blende is more fit for the zinc furnace.

SPECIAL CORRESPONDENCE.

Butte. Feb. 5.

(*From our Special Correspondent.*)

Regarding Mr. Scallon's resignation as president of the Anaconda Copper Mining Co., it has been known here that Mr. Scallon was anxious to surrender his position, and some seven months ago wanted to be relieved, but was persuaded to stay by H. H. Rogers. There is great speculation here as to who will take Mr. Scallon's place, the exactions of the position are great, as peculiar legal and political tangles need solving. The person, whoever he may be, will probably not find a bed of roses.

The "fair trial" bill, giving to litigants a change of venue to some other court, allows each side in a legal controversy a right to a change five times. Therefore each case is liable to be taken before ten different judges before it is tried on its merits. All that is required for a change of judges is an affidavit of some interested party. Such a law should be sufficient to satisfy the most fastidious iitigant.

The old mining district around Corbin, Jefferson county, is quite active, where it is thought that a copper field of merit will be opened up by the men, who are sinking several shafts to 500 ft. or more. It is announced that men identified with the American Smelting & Refining Co. are behind some extensive development. The McCornicks, of Salt Lake, are at work on two shafts.

The "Pittsmont" smelter, the new plant of the Pittsburg & Montana Copper Co., built on the flat in East Butte, will probably be in commission within the next week or so; the management has been actively purchasing copper ores. The success of this plant, built on new methods, will mean much for Butte and vicinity. The company has gone at its work quietly, without any flourish of trumpets, spending its own money, feeling fully assured of its position.

Denver. Feb. 6.

(*From Our Special Correspondent.*)

Governor Peabody, by proclamation, has suspended martial law in Cripple Creek and the prisoners held by the military have been turned over to the civil authorities.

It is estimated that the output of the Cripple Creek district for January amounted to over 50,000 tons of a bullion value of $1,753,000.

The coroner's jury that investigated the recent fatal accident at the Stratton's Independence mine returned a verdict that the accident was caused by the engineer losing control of the engine and that the management had neglected these precautions: (1) No man was required to preside at the collar of the shaft while hoisting men; (2) no safety device was in use to prevent over-winding; (3) men were loaded and unloaded without placing the cage on chairs; (4) the disc brakes on the hoisting engine were detached from their usual position and therefore useless. The jury recommended that the safety appliances and precautions above specified be adopted by all mines in the district not already using the same. The board of inquiry, convened by State Commissioner of Mines E. Lyman White, reported these suggestions: (1) To restrict use of cages in counterbalance when hoisting men; (2) the use of some suitable over-winding device; (3) the use of chairs in the gallows frame at a point that will insure the catching of the cage if the cable is released; (4) the testing, by some competent person, of the safety clutches on cages at regular intervals. In his report to Governor Peabody, Mr. White stated that he thought the disaster was due to causes purely accidental and beyond control. Governor Peabody says that the Colorado laws relating to safety appliances are so conflicting that he has referred the report of the board of inquiry to the State attorney general to determine whether local authorities or State authorities can compel companies to provide proper safeguards.

Judge Theron Stevens, at Telluride, has refused to grant the injunction against the military, sought by members of the Western Federation of Miners, who have been deported from San Miguel county by the military. Judge Stevens based his opinion upon the law which Governor Peabody has cited as authority for enforcing military rule. Half the remaining soldiers who have been on duty in the county have been relieved, leaving only a provost guard of about 70 picked men.

San Francisco. Feb. 3.

(*From Our Special Correspondent.*)

A bill has been introduced in Congress by Representative Gillett, of Massachusetts, to give hydraulic miners in this State the right to have suits against them tried in the Federal courts whenever they set forth the plea that they are operating under permits from the California Debris Commission, which alone has the right, under the Caminetti law, to grant them licenses to hydraulic in the drainage basins of the Sacramento and San Joaquin rivers. This bill is provoking the opposition of the Anti-Debris Association. The miners are anxious to have such suits tried in the Federal courts, where they may expect more exact justice.

The case of J. M. O'Brien against the Grass Valley Consolidated Mining Co. is of general interest to miners. The company was organized under the laws of Arizona, which preclude the levying of assessments, began to reopen the mine and raised considerable money. It put in hoisting and pumping machinery, air compressors, etc., and did a lot of development, mainly dead work, and then ran out of money. It borrowed some money from O'Brien, and when the time for the payment on the bond came the stockholders refused to advance more. Mr. O'Brien then took the property himself by paying to the original owner of the mine the amount due. Litigation ensued and the company has lost its property unless the decision is adverse to O'Brien. The mine is considered valuable and will doubtless be again worked.

Minority shareholders of the Mount Jefferson mine at Groveland have sued the majority shareholders alleging that the defendants fraudulently conspired to sell $150,000 of stock by representing that the stock was earning 2% per month a share, also that some of the money thus obtained was paid out as a dividend to purchasers, but not to holders of other shares. Counter charges are made.

William B. Ewing, of the Standard Oil Promotion & Investment Co., one of the "get-rich-quick" concerns organized during the oil excitement a couple of years since, is being tried in the United States District Court on the charge of using the mails with intent to defraud. The company paid a few dividends, but finally both Ewing and Chaney disappeared. Ewing was lately arrested in Chicago. The pair are said to have obtained some $250,000 in cash. The testimoney has shown that at one time 20 stenographers were required to carry on the correspondence of the company.

Rights of way have been granted to the National Oil & Transportation Co. for a pipe line from the Coalinga oil fields in Fresno county to Moss Landing, Monterey county, on the Pacific ocean beach. A 6-in. pipe line is expected to carry 10,000 bbl. of oil daily.

Toronto. Feb. 5.

(*From our Special Correspondent.*)

The annual meeting of the Canadian Society of Civil Engineers was held in Montreal recently, closing on January 28. The following officers were elected: President, Col. W. P. Anderson; vice-presidents, C. E. W. Dodwell, C. H. Keefer, and E. Marceau; treasurer, H. Irwin; secretary, C. H. McLeod; librarian, E. G. M. Cape; members of council, G. H. Duggan, John Kennedy, W. McL. Walbank, M. J. Butler, H. J. Cambie, Phelps Johnson, P. W. St. George, D. Macpherson, W. R. Butler, R. B. Rogers, C. B. Smith, W. B. Mackenzie, R. B. Owens, E. H. McHenry, St. G. J. Boswell.

The valedictory address of K. W. Blackwell, the retiring president, dealt with the transportation problem. Mr. Blackwell showed by figures that easy grades were essential to satisfactory results for rail transportation. As regards possible further reductions, he went on to say that while the public were paying on an average about .7c. per ton per mile for freight rates, a large amount of mineral and grain traffic was handled below .35c. per ton per mile.

The Cariboo-McKinney Mining Co. held its annual meeting in Toronto on February 2, and decided to pay a 4% dividend from cash in hand to shareholders, but to suspend development work until conditions were more settled.

The Canadian Pacific and Grand Trunk railways have subscribed $5,000 per annum each, and the Canadian Northern $2,000, for a school of railroad engineering at McGill university. and negotiations are going forward with other roads. The preliminary work of drawing up a scheme of studies has been entrusted to a committee including Mr. Morse, third vice-president of the Grand Trunk, and chief engineer McHenry, of the Canadian Pacific. The work to be done will include instruction in location comprising all branches of surveying, construction, bridge building, ballasting, track-laying and operation, including maintenance, conducting of transportation and equipment. It is hoped to have the school in operation by September next.

Victoria. Feb. 2.

(*From Our Special Correspondent.*)

Coast Districts.—Good progress is reported in the development of the Marble Bay mine, on Texada Island. Between the 460-ft. level and the 360-ft. level, at the base of the slope, the pay ore measures 35 ft. wide. During 14 days in December, the Tyee Copper Co. smelted 3,514 tons, producing 311 tons of matte, the gross value of which, deducting cost of refining and purchase of custom ores, was $35,221. The Pacific Mineral Extraction Co., Ltd., is being promoted in Vancouver, to acquire the Canadian rights of the De Keyser process, patented in 1900. A small plant has been erected in Vancouver to treat consignments of ores of over 50 tons at $4 per ton.

East Kootenay District.—The Ptarmigan mine, at Wilmer, is to suspend work. The Dominion group, near Marysville, on the St. Mary's river, has been acquired by a Spokane syndicate. The property contains a vein of galena and one carrying gold and copper values, and has been partly developed.

Nelson District.—Work has been suspended at the Star mine, at Granite. There is talk of reconstructing the company. On the Foghorn, at Ymir, 6 ft. of shipping ore are reported in the drift of the No. 3 vein. Development work is to start on the Monarch, owned by the Monarch Gold & Copper Mines, Ltd. At the Ymir several employees have been discharged and expenses reduced in other directions; only 20 stamps are in use.

Northwest Kootenay District.—The Lanark group of mines at Illecillewalt has been purchased by a local syndicate from the Lillooet, Fraser River & Cariboo Gold Fields, Ltd., an English company now in liquidation. In No. 5 cross-cut tunnel of the Eva mine, at Camborne, an ore-body, 6 ft. wide, with values averaging $12, is reported. The last monthly clean-up realized $11,400.

Rossland District.—At the Le Roi the big ore body of the 800-ft. level has been encountered on the 900 ft. In the 800-ft. it was 80 ft. wide and of good grade. In the 900-ft. level the shoot is as strong and the values are said to be higher. At the Spitzee, a cross-cut from the main drift, on the first level, has passed through 4 ft. of ore, carrying good copper values. Operations have begun at the No. 1 mine, it being proposed to ship ore from the 200 and 300-ft. levels to the Granby smelter.

San Luis Potosi. Feb. 2.

(*From Our Special Correspondent.*)

It is reported that the Standard Oil Co. may buy up the Mexican Petroleum Co.'s equipment and wells in the oil fields near Ebano, about 35 miles inland on the Mexican Central from Tampico, in the State of Vera Cruz. The Percy Oil Co. is the name of a new company with a capital of $10,000,000, which will soon begin drilling on a 700-acre tract near Tampico. It plans to pipe oil to Tezuitlan and then carry it on tank cars over the railroad to points of distribution.

The recent change in the management of the Tezuitlan Copper Co. and the filling of the position by Mr. H. W. Hixon, has caused reports that either the Guggenheim Exploration Co. or the American Smelting & Refining Co.

has control if the Tezuitlan Copper Co. Probably Mr. Geo. D. Barron, its president, still holds control. For many years he too was connected with the Guggenheims, but is now quite independent.

In Sonora a copper district is being opened up by the Transvaal Copper Co., known as Las Verdes, near Cumpas. At the Transvaal the mine water contains so much copper as to cause great difficulty with pipes and pumps. The Buckeye and Cobre Rico have struck copper ore; the Carolina and Antigua have galena; the San Luis and Fresnal sulphide and arsenide of silver, and the Golden Goose, Virginia and Vogeler gold ores.

The great difficulty in collecting assessments, and the slump in stocks, caused by such assessments, at El Oro and Tlalpujahua, of Mexico and Michoacan, has finally culminated in the closing of the Lill, Jupiter, Tultenango, Bessie, Presa Nueva, Santa Rosa, Santa Rita and María Teresa. These properties will wait for the ground to be proven by others with more capital. The Noche Buena will do this for the Lill, and the Old Abe for the Jupiter. Chandos Stanhope, of the Consolidated Gold Fields of South Africa, has taken the Libertad, adjoining the Dos Estrellas and La Union, and will begin work at once.

The American Mining & Exploration Co., N. C. Petit, president, capitalized at $120,000, Mexican, has been formed in the city of Mexico, to operate El Pardo and La Genovesa mines near Zacualpan, Mexico.

London. Jan. 27.

(From Our Special Correspondent.)

The Wright prosecution was particularly noteworthy for the extreme difficulty experienced in convincing the Government and the public prosecutor that any statutory offence had been committed. In the light of the eventual result of the trial, the obliquity of vision of the law officers of the Crown is inexplicable. Difference of opinion has also existed in legal circles and among the public as to the enormity or otherwise of the technical offences alleged by the prosecution. The opinions expressed by the law officers of the Crown made many people think that no conviction would result, and even to those who anticipated the present verdict, so severe a sentence came as a surprise. The chief technical offence proved was the falsification of the balance sheets of 1899 and 1900, with the intention to defraud shareholders and creditors; but as these falsifications were made for the purpose of temporarily tiding over certain adverse circumstances, it was considered that the offence was not a very serious one. This, however, is not the way offences are looked at in English courts of law, for though a verdict can only be given on points which come under statutory recognition, the sentence depends on a review of the whole of the circumstances and of the history of the individual and of his methods. In properly appraising the nature of the offence in this particular case, a great many other things had to be considered than the actual transgression of the statute. For instance, at the meeting following the issue of one of these fraudulent balance sheets, the defendant made a speech in which he laid particular stress on the fact that the London & Globe eliminated risks incidental to mining by spreading its interests in many directions, and he announced that their policy was to pay a steady 10% and build up a large reserve of cash.

This was really a greater moral fraud than the issue of a false balance sheet, for it induced people to think that the company's shares were a sound investment and not a wild speculation. Mr. Wright and his champions on other occasions have said that everybody knew that the whole thing was a wild gamble. Those behind the scenes, and versed in city methods, knew it, certainly; but innocent investors (and there are a great many innocent people in the world) were attracted by his promise of sound finance and regular 10% dividends. The presence of the Marquis of Dufferin on the board of directors had great influence on this class of investors, for it was not theirs to know that the noble and amiable Marquis had not a ghost of a knowledge of finance. Other offences against commercial morality were the issue of fraudulent prospectuses in connection with the British America Corporation and the Standard Exploration Co. In the former case the prospectus led the reader to believe that valuable properties were to be acquired with the money subscribed, whereas only irresponsible negogiations for options on them had been entered into; while in the latter case, the chief bait was a fabulously valuable placer deposit on Baranoff Island, Alaska, of which even the existence had not been demonstrated by Mr. Wright or his representatives.

Altogether, the result of the trial must be deemed satisfactory by all who wish to see mining divested of evil influences, and placed in a position of repute, side by side with other legitimate commercial enterprises. There are still in the city of London several men in high positions, to say nothing of many in inconspicuous positions, who have transgressed the ordinary laws of commercial morality in connection with mining flotations, and who ought, if everyone had their deserts, to receive similar sentences, but who, owing either to their having evaded any technical breach of the law, or to the fact that their victims are not rich enough, or public spirited enough, to set the law in motion against them, have so far escaped scot-free. To such people the judge's decision that the issue of false balance sheets, with intention to defraud is an indictable offence, may act as a corrective. If so, the Whitaker Wright trial will not have been without its influence in the suppression of devious methods of finance.

It is only fair to myself, in the capacity of correspondent to the JOURNAL, to say that I have invariably pointed out the utterly indefensible character of the operations, mining and otherwise, of the late Mr. Wright. When I commenced to act as correspondent, eleven years ago, almost the first case I investigated was the Abaris Mining Corporation, which Mr. Wright had formed to acquire a property in Zacatecas. On inquiry, I found that the property specified did not belong to the company, for, as it had not been worked and the taxes had not been paid, the company's proprietorship had lapsed. I subsequently found also that he had contracted debts for machinery with a firm in San Francisco, and that, as the money was not forthcoming, the firm had been obliged, at considerable loss, to take the machinery away elsewhere.

I said recently that the removal of the action from the criminal court to the Court of King's Bench transformed the action from a criminal one to a civil one for damages. This was wrong.

Johannesburg. Jan. 4.

(From Our Special Correspondent.)

The paucity of kaffir labor on the Rand is the chief topic of conversation. Hence the interest taken in a debate in the Legislative Council. Sir George Farrar introduced a motion approving of the introduction of Chinese labor for the mines and requesting the government to legalize it, which was carried by 22 votes to four. Probably the ordinance will pass the Council and receive the assent of the Home Government. The question is, will the Chinese come in large numbers, when they know all the restrictions?

A small majority has been most strenuous in its opposition to the importation of Chinese and has predicted dire calamities if the main industry of the State is built up on indentured coolie labor. Natal is taken as an example of how the Indian has ousted the white man out of his position in many instances. There is a vital difference, however. In Natal legislation came after importation; here it will come before and be very drastic.

Here are some figures of Chinese immigrants into the Transvaal: From 1880 to 1892, 83 Chinese came in; from 1893 to 1895, 188 Chinese came in; from 1896 to 1899, 589 Chinese came in; from 1900 to 1903, 78 Chinese came in. It will be noticed that only 78 have come in since the British occupation. These figures prove that a flooding of the country by Chinese can be prevented. The advocates of Chinese labor look upon the scheme simply as an expedient to bridge over the next four or five years. Eventually they hope to see the whole industry run by white men. The aim of the two parties, therefore, is the same—namely, to make this a white man's country.

The outlook for the next year or so is not bright. The increase of native laborers will be small, and even if the Chinese come, it will take months to get the scheme in full working order. Also it will be expensive, the cost of importation per head being reckoned at £15 at least.

Prospecting is still active in the Heidelberg and other districts. Good results are reported from some bore holes. Wild-cat diamond schemes are in evidence, and are much appreciated by speculators, disgusted at the stationary prices of well known stocks. Some mines have curtailed operations; others have closed down until the labor market improves. Very little shaft-sinking on the 'deep deeps' is possible under the circumstances.

The failure of the Klerksdorp gold and diamond mine is reported. This company adopted dry crushing of its ore. The eight reasons for the failure of the dry crushing process, as given by the engineer, are as follows: Wear and tear from dust; uneven crushing of the ore, preventing proper leaching; the difficulty in getting an even product and the tendency to make slimes; clay in the ore necessitated washing before treatment; the gold is very coarse within the oxidized zone, but covered with pyrite below; coarse gold cannot be recovered by the cyanide process alone, and a supplementary treatment is necessary; the uneven product, when in the cyanide vats, leads to channeling while the solution is being drained off; a large quantity of the finest ore, carrying three times as much gold as the coarser ore, gets blown away, causing a serious loss. LANE CARTER.

Sydney. Dec. 15.

(From Our Special Correspondent.)

New South Wales.—At Broken Hill further heavy rains have fallen, and the Stephens creek reservoir, which suppplied the town and mines, has overflowed. The Proprietary mine, owing to the heavy freight charges, is about to undertake the manufacture of salt cake and sulphuric acid for local use.

At Charters Towers, on the Blue Peter claim, a reef carrying 3 oz. gold per ton, has been struck. It is estimated that the Charters Towers mines will pay £70,000 in dividends for December, making a total for the year of £450,000 in dividends, an increase of £46,000 over 1902. The output of the Queen Cross reef for the half year was 41,956 oz., averaging 3 oz. per ton.

The latest returns from the New Chillagoe smelting works give: Copper ore treated—3,818 tons, yielding 164 tons copper, 10,436 oz. silver; lead ore—2,109 tons, yielding 461 tons lead and 24,524 oz silver; a total for the year ending October of 2,216 tons copper and 156,259 oz. silver.

The Great Cobar Copper Syndicate's new blast furnace has arrived. It is of the same design as those at Mt. Lyell, being 168 in. by 40 in. at the tuyeres. A bessemer converter is ready for use. A large crusher to treat 120 tons per hour, together with new hoisting engines and boilers are under order. With the new improvements it is expected that from 4,000 to 5,000 tons of ore per week will be treated by the two furnaces.

Queensland.—The gold output for November was 57,416 oz. fine, worth £243,899, and the total for the eleven months of 1903 totalled 597,328 oz. fine, worth £2,537,424, an increase of 36,507 oz. fine over last year.

South Australia.—Copper ore, assaying 32%, is reported near Port Augusta; this is important, as considerably extending the area of copper-bearing country there. Several large deposits of phosphatic rock are reported at Clinton, containing up to 75% tricalcic phosphate. The fortnightly returns from the Wallaroo smelting works are: Copper, 231 tons; silver, 2,020 oz.; gold, 153 oz.; sulphuric acid, 179½ tons.

Tasmania.—Tin ore is reported found at Zeehan. The North Mount Lyell output is now 250 tons daily, ranging from 40% ore at 350 ft. to 4% in the open-cut. The winze below the 400-ft. level is reported going through solid bornite, giving 18% copper; it is proposed to sink the winze to 500 ft. At Mount Lyell 6,000 tons of ore are taken from the open-cut weekly. The 2,000 tons of rock on the gold dump heap is being treated and yields 5% copper, 9 oz. silver and 4 oz. gold per ton.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of the ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making this office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

TO ENGINEERS VISITING LONDON.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers nonresident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution, and thus enjoy the advantages of temporary office accommodation in the city of London

PERSONAL.

Mining and metallurgical engineers are invited to keep the Engineering and Mining Journal informed of their movements and appointments.

Mr. J. A. Finch, of Spokane, is visiting New York.

Mr. Geo. A. Packard, of Boston, is now in New York.

Mr. J. R. De Lamar, of New York, has been in San Francisco.

Mr. Richard Hamilton is en route from London to Kalgoorlie.

Mr. S. Herbert Williams arrived from London by the *Umbria* on February 8.

Mr. Edwin E. Chase, of Denver, is at present professionally engaged in Utah.

Mr. W. R. Rust, manager of the Tacoma smelter, is in New York on business.

Mr. Wm. A. Farish left Denver recently for a three weeks' trip to Sonora, Mexico.

Mr. J. H. Curle wrote last from Shanghai, but he is now in the interior of Siberia.

Mr. Philip Argall returned to Denver recently after a six weeks' trip in Mexico.

Mr. Fernand Robellaz, of Paris, has reached New York on his way to Kingman, Arizona.

Mr. Max Boehmer is now manager of Stratton's Independence mine, at Cripple Creek.

Mr. Wm. W. Van Ness is consulting engineer to the Roudny-Zwestow mines in Bohemia.

Mr. E. McCormick, of Montana and Idaho, has gone to Central America to examine mines.

Mr. M. S. Beal, formerly of Cripple Creek, has arrived in New York from the Philippine Islands.

Mr. H. W. Hardinge has returned to Denver from Parral, Mexico, where he spent about a month.

Mr. Howard D. Smith has opened an office as mining engineer in the Rialto building, San Francisco.

Mr. H. W. Hixon succeeds Mr. E. R. Dalbey as general manager of the Tezuitlan Copper Co., Mexico.

Mr. A. A. Blow has been making an examination of the British Broken Hill mine, in New South Wales.

Mr. William Blakemore has removed from Montreal to Nelson, B. C., where he will reside hereafter.

Mr. Dennis Clark has been appointed manager of the American Eagle Mining Co., at Elk City, Idaho.

Mr. Geo. L. Mackenzie is manager of the Van Anda mines and smelter on Texada Island, British Columbia.

Mr. Hallaman, manager of the Jumpers Deep, has taken charge of the Crown Deep mine at Johannesburg.

Mr. Louis J. Marks has returned from Mexico and proceeded to London by the *Kaiser Wilhelm* on February 9.

Mr. W. E. Defty, of Phoenix, Ariz., has been examining mines in Yavapai county and leaves on February 20 for Mexico.

Mr. Arthur Winslow was elected president of the Liberty Bell Gold Mining Co. at the annual meeting at Kansas City.

Mr. Emerson Gee, of Los Angeles, Cal., is on a trip to Culiocan and interior points of Sinaloa and Durango, Mexico.

Mr. A. Morgan, of California, is now superintendent of the Zubiate mine, Sonora, Mexico, vice Mr. P. E. Murray, resigned.

Mr. Frank Robbins has returned to Los Angeles after examining the Polkadot group of mines, near Kernville, California.

Mr. Charles Clark, son of Senator Clark, is general manager of the United Verde Copper Co., succeeding the late H. J. Allen.

Mr. Sidney Jennings, consulting engineer to Messrs. H. Eckstein & Co., is on his way from Johannesburg to London, on a holiday.

Mr. George O. Buchanan, of Kaslo, B. C., has been appointed by the Dominion Government to the position of inspector of lead bounties.

Mr. T. H. Oxnam, manager of the Palmarejo & Mexican Gold Fields, Ltd., was at the mines at Palmarejo, Chihuahua, Mex., recently.

Mr. Arthur R. Townsend, who made a short visit to New York and, subsequently, Cripple Creek, is now again at Telluride, Colorado.

Mr. P. M. Nissen, formerly in charge of some of the Clergue works at Sault Ste. Marie, Ont., recently arrived in Toronto from Arizona.

Mr. Geo. A. Shroeter is now manager of the Dolores mine, in Chihuahua, Mex., recently taken over by the Mines Company of America.

Dr. S. H. Quint, of Camden, N. J., has taken charge of the laboratory of the Central Mining Co., at Ixtlan del Rio, in the territory of Tepic, Mexico.

Mr. Walter R. Pierce, of the Grand River Lead & Zinc Mining Co., Golconda, Ill., is examining lead, zinc and fluorspar deposits in Mexico.

Mr. Wilkins M. Greene, general manager of the Fentress Mining Co., Greensboro, N. C., is in New York in connection with the business of his company.

Mr. Charles Butters, of Claremont, Alameda county, Cal., is moving his various assaying outfits to his home there, where a large building is being erected.

Mr. Wm. R. Boggs, Jr., for many years engaged in work in Mexico, is manager of the Campania Metalurgica Argentina, of Villa Mercedes, Argentine.

Mr. Simon Guggenheim and Mr. E. L. Newhouse are now in Denver, on their periodical visit to the plants of the American Smelting & Refining Company.

Mr. Edward Walsen, of Denver, has been placed in charge of the cyanide department of the Dorcas Mining, Milling & Development Co., at Florence, Colorado.

Mr. Walpole Roland, after passing the last six weeks in the mineral regions of northern Minnesota, recently returned to his home in Port Arthur, Canada.

Mr. H. Klingermann has been appointed general manager of the H. C. Frick Coke Co., at Uniontown, Pa., to succeed Mr. O. W. Kennedy who recently resigned.

Mr. C. L. Logue, formerly chief chemist of the Anaconda copper refinery, Anaconda, Mont., is now head assayer and chemist for the Taylor & Brunton Ore Co., at Butte.

Mr. J. J. Anderson, who was superintendent of the Gobbler mine at Wentworth, Mo., has been examining mineral deposits in Georgia and is now staying at Joplin, Missouri.

Mr. C. J. Price, formerly manager of the Geldenhuis Deep, and for the past five years manager of the Crown Deep mine, is acting as consulting engineer to the Messrs. Eckstein.

Mr. Wesley W. Warren, lately with the Butte-Tonopah Co., at Tonopah, Nev., has been appointed consulting and constructing engineer of the new Drew Mining Co., at Juneau, Alaska.

Mr. T. H. Tracy has resigned as general superintendent of the North American Copper Co., Encampment, Wyo., and accepted a position with the Allis-Chalmers Co., of Chicago, Ill., at the New York office.

Mr. H. C. Livingston, for the past 17 years superintendent of the Omaha Grant smelter at Denver, has been appointed superintendent of the Everett plant of the American Smelting & Refining Co., at Everett, Washington.

OBITUARY.

Henry W. Oliver, president of the Oliver Iron Mining Co., died at Pittsburg, Pa., on February 8 from a complication of diseases. He was 64 years old. Mr. Oliver was born at Dungannon, Ireland, but his parents came to this country when he was two years old. He started work as a shipping clerk for an iron firm at Pittsburg in 1863, and later went into business for himself. He was successful in his ventures, and within 20 years was at the head of iron and steel industries employing 3,000 men.

William A. Hamill, for many years identified with Colorado mining, more particularly at Georgetown, died at St. Joseph's Hospital, Denver, on February 3 from blood poisoning. He was born in England, but came to America when a boy. He served in the Union Army through the Civil War. After the war he went to Georgetown, engaged in mining and became one of the foremost mining superintendents in the West. He first became prominent in connection with the Dives-Pelican mining litigation and was at the head of the Dives property. The contest arose over a conflict of lodes and continued for several years, causing much bitter feeling. An attempt to assassinate Mr. Hamill failed, though he was waylaid in one of the drifts and had to fight his way out. Mr. Hamill was with the Terrible mine, at Georgetown, and when it was sold for $500,000, in 1870, he found that the Terrible Co. had got ahead in patenting the ground. He then obtained possession of all the adjoining ground. Senator Jerome B. Chaffee became his partner and close friend until Mr. Chaffee's death. Mr. Hamill made his headquarters in Denver for a number of years, although his home was at Georgetown. He leaves a widow, three sons and one daughter.

SOCIETIES AND TECHNICAL SCHOOLS.

COLUMBIA UNIVERSITY.—The trustees have voted to fix the annual fees for tuition in the School of Applied Science at $250 on and after July 1, 1904. The present fee is $200. This change is made to meet the increased cost of tuition, which now is believed to be greater than at institutions where tuition fees are higher. The circular announcing the change states that because of the ample provision made for scholarships which meet the cost of tuition, and for assisting students to pay their own way while taking a university course, it is believed that no deserving student will be deprived of the privileges which Columbia University offers because of the tuition fee.

ENGINEERS' CLUB OF PHILADELPHIA.—At the meeting on January 16, 80 members and visitors were present. The following officers were elected: President, Carl Herig; vice-president, T. O. McBride; secretary, J. O. Clarke; treasurer, G. T. Gwilliam; directors, George C. Davis, Washington Devereux, William Easby.

President Smith's address was on 'Some Early Engineering Work in Pennsylvania.' He pointed out that there was no school in this country devoted to education of civil engineers until the Rennselaer Polytechnic Institute was founded in 1835, while the mechanical engineer was represented by the expert mechanic. The early work on canals, tunnels and railroads in Pennsylvania was done by men who were engineers by instinct and self-training.

Dr. Henry Leffman gave a short talk on the distribution of deaths from typhoid fever in Philadelphia and the relation to the sources of water supply.

INDUSTRIAL.

A hydraulic plant is to be constructed on El Fuerte river, State of Sinaloa, Mex., it is reported, in which Edward T. Leclair, of El Fuerte, is interested.

The Berwind-White Coal Mining Co. has engaged additional office space at 1 Broadway,

New York, which gives the company almost an entire floor of the building.

The C. O. Bartlett & Snow Co., Cleveland, O., has shipped a single cylinder direct heat rotary dryer to the Dakota Pressed Brick Co., Deadwood, S. D., to be used for drying sand.

The Denver branch of the Jeanesville, Pa., Iron Works Co. recently sold the Camp Bird mine, of Ouray, Colo., two electric power pumps for 1,000-ft. lift, the highest electric lift in the State; also a steam pump, 600 gal. capacity, to Victor, Colorado.

The Weber Gas & Gasoline Engine Co. is building a large gas engine to be exhibited at the St. Louis World's Fair. The rated capacity is 150 h. p. It will be of the vertical two-cylinder type and will have a gas producer and an electric generator attached.

The Onderdonk Engineering Co. has opened its new offices and warehouses at Denver, Colo., and will represent the following houses: The Babcock & Wilcox Co., the Keasbey & Mattison Co., the Foster Engineering Co. and the Goubert Manufacturing Co. Construction work will be a specialty.

The firm of Victor M. Braschi & Bro., city of Mexico, Mex., has been dissolved and the partnership of Victor M. Braschi & Co. formed to continue the mining machinery business of El Almacen De Las Minas. The coal and coke business of the last named company will be continued under the firm name of Braschi Brothers.

The Yawger-Lexow Co., of New York, states that its business in carbon and bortz, with the same interests as heretofore, in spite of the death of Theodor Lexow, will continue without interruption. I. C. Yawger will act as president, Henry Demmert as vice-president and traveling representative, and A. H. Vorster as secretary and treasurer.

The American Process Co., of New York City, recently installed a direct heat sand dryer for the Granite Brick Co., at Glens Falls, N. Y., and has finished the installation of a clay dryer for the Chattahoochee Chemical & Mining Co., of Girard, Ala., as well as a direct heat dryer for M. P. Hubbard & Co., of Baltimore, Md., to dry sulphate of lime refuse.

At the annual meeting of the Salisbury Steel & Iron Co. at Utica, N. Y., the officers elected were: Judson W. Warner, president; Henry N. Clark, vice-president; Wm. H. Switzer, secretary and treasurer; F. R. Switzer, assistant treasurer; Marcus Ruthenburg, consulting engineer. The financial statement showed the company to have no indebtedness and a handsome surplus on year's business.

The Imperial pneumatic tool department of the Rand Drill Co. reports large increases in sales since the first of the year. The company is receiving orders for piston air drills, woodboring machine and hammers and the installation of a number of complete pneumatic tool plants in railroad shops, shipyards, boiler works, foundries and bridge and iron works, both in this and foreign countries.

The Republic Engineering Co., of Pittsburg, will take over the business of the Diescher Coupling Co. The officials of the company are S. E. Diescher, president; James E. McNary, vice-president, and F. E. Russell, secretary and treasurer. The company manufactures transmission equipment, pipe couplings, elevating and conveying machinery, coal washeries under the Diescher patent, and special machinery.

The DeRemer Water Wheel Co., Denver, Colo., has closed a contract with the Hercules Mining Co., Burke, Ore., for one 5-ft. and one 4-ft. DeRemer water wheels on one shaft. The difference in the diameter of the water wheels was made to conform to the different vertical heads under which the wheels will work, one being 790 and the other 454 ft., giving a velocity of 400 revolutions per minute. The DeRemer company also closed a contract with the Mexico Mine & Smelter Supply Co., city of Mexico, Mex., for one 6-ft. DeRemer water wheel. This wheel will be located in a cañon at water's edge and transmit its power by a vertical shaft 140 ft. long to the mill above.

The United Iron Works, manufacturers of step pressure pumps, water wheels and complete hydraulic placer equipment, has recently moved to its new office and sales room, at 32 Fremont street, San Francisco, where it will have more office room and an opportunity to display its special machines. The United Iron Works succeeded the Oakland Iron Works and recently absorbed the John A. Yeatman Co., of 13 First street, San Francisco, besides some other firms. The works are located corner of Second and Jefferson streets, Oakland, where there are a foundry and machine shop, advantageously located for handling freight. The company employ regularly about 150 men and have ample facilities for many more.

That a great, modern freight steamer requires four times the amount of weight in blocks for various purposes that would be required by an ordinary sailing vessel is shown by the fact that the blocks used on the steamship *Dakota*, launched at the yards of the Eastern Shipbuilding Co., on February 6, weigh in all 20 tons. These blocks are of special design, the cargo blocks being of steel and having a capacity of from 40 to 60 tons each. The specifications called for approved designs and for patented articles used in the highest class of marine work. Star (metalline) bushed sheaves were specified for cargo blocks, roller bushed sheaves for lighter work and standard automatic releasing hooks for the lifeboats, these hooks being adopted by the United States Government. The blocks were made by the Boston & Lockport Block Company.

The Fred. M. Prescott Steam Pump Co., Milwaukee, Wis., reports the following shipments made recently: A vertical beam condenser, capacity 70,000 lb. of steam per hour, to the Denver Tramway Power Co.; a triple expansion mine pumping engine to the Republic Iron & Steel Co., capacity 2,500 gal. per minute against 500 ft. head; one to the Clairton Steel Co., and two to the El Oro Railway & Mining Co., Ltd.; a compound and condensing mine pumping engine to the Clover Leaf Gold Mining Co.; two boiler feed pumps to the Tennessee Coal, Iron & Railway Co., Birmingham, Ala. Among recent orders are booked the following: From the Penn Iron Mining Co., Vulcan, Mich, four pumping engines and four sinking pumps; from the Cleveland-Cliffs Iron Co., three pumping engines; from the Calumet & Pittsburg Development Co., Bisbee, Ariz., two pumping engines.

TRADE CATALOGUES.

Fans, blowers and hot blast apparatus are described and illustrated in a small vest pocket-size pamphlet recently issued by the American Blower Co., of Detroit, Michigan.

"Water Meters" is the title of an 8-page pamphlet recently issued by the Henry R. Worthington Co., of New York, describing and illustrating its new disc meter and its standard duplex piston meter.

Narrow gauge railways and equipment, together with various styles of dump cars, are given considerable space in a 52-page catalogue published by the C. W. Hunt Co., of West Brighton, New York.

Aerial tramways and other applications of wire rope and haulage are described in a recent catalogue of the Broderick & Bascom Rope Co., of St. Louis, Mo., which contains as well a brief treatise on hoist conveyors, suspension bridges and log haulage.

Mill men interested in handling sands will find valuable the contents of a catalogue recently issued by J. H. Frenier & Son, of Rutland, Vt. It deals with the Frenier sand pump, adapted not only for elevating slimes and tailings, but for feeding concentrators or jigs, etc.

The Atlas Car & Manufacturing Co., of Cleveland, O., has issued a well-illustrated catalogue, No. 1018, briefly illustrating and describing its various styles of mine and ore cars, the list being supplemented by an extensive line of dump cars, buckets, overhead trolleys, industrial railway equipment, etc.

The Ottumwa box car loader, its advantages and ability to reduce operating expenses, are set forth in catalogue No. 5, recently issued by the Ottumwa Box Car Loader Co., of Ottumwa, Ia. These loaders are for loading coal, ore, lime and any other loose material in box cars. The illustrations show a number of plants that have already installed the loader.

Harron, Rickard & McCone have embodied in catalogue No. 6 much valuable information on the Huntington centrifugal roller quartz mill, its use, erection and operation. Other machinery, which naturally goes with the mill in a mining plant, is also described. The same company devotes catalogue No. 5 to its hydraulic mining machinery. The pamphlet contains much information on the operation of hydraulic plants.

GENERAL MINING NEWS.

The members of the joint conference of Indiana, Ohio, Illinois and western Pennsylvania operators and miners having failed to reach an agreement on the wage scale for the year beginning April 1, adjourned on February 3 to meet in conference again in 30 days. The operators will probably push the work at the mines and get out all the coal possible before the expiration of the present contract. The miners appeared equally anxious to get back and make all the money possible before enforced idleness comes if a strike is called. Railroads and manufacturers have begun to lay in a reserve supply of coal.

The adjournment without an agreement breaks the long records of the competitive States' joint conferences. The motion for an adjournment was made by Mr. F. L. Robbins, of Pittsburg, who said: "The scale committee has found it absolutely impossible to agree on a scale for the ensuing year, and after consultation we have deemed it wise to recommend that rather than let die a movement of so much benefit to operators and miners, an adjournment should be taken in the hope that we may reach an agreement that will keep alive the interstate movement and joint agreement." Mr. Mitchell, of the Mine Workers', seconded the motion.

There are many comments on the situation. It is charged that the adjournment was planned by the operators, who desired to profit by the stronger market, and that the Ohio and Pennsylvania operators have 4,000,000 tons of coal stored already. A suspension of operation in the four States would cause 117,000 men to go out. It is already apparent that political pressure will be brought to bear on the operators to prevent a general suspension, as a strike in the four States would have wide effect. It developed in the closing session of the joint scale committee that the miners' demand for the readjustment to the run-of-mine basis and the flat differential of 7c. would carry an increase of more than 12% on coal mined on the run-of-mine basis in Illinois and Indiana and about the same in coal mined by machinery in Ohio and Pennsylvania.

Chesapeake & Ohio Railway Co.—Coal and coke shipments in the six months, from July to December, 1903, compared with 1902, are reported in short tons, as below:

Coal.	1902.	1903.		Changes.
New River	727,227	1,576,603	I.	849,376
Kanawha	376,569	985,549	I.	608,980
Kentucky	38,608	85,305	I.	46,697
	1,142,404	2,647,457	I.	1,505,053
From connections	86,434	99,055	I.	12,621
Total	1,228,838	2,746,512	I.	1,517,674
Coke:				
New River	120,703	152,348	I.	31,645
Kanawha	20,246	25,262	I.	5,016
	140,949	177,610	I.	36,661
From connections	2,234	150	D.	2,084
Total	143,183	177,760	I.	34,577
Grand total	1,372,021	2,924,272	I.	1,552,251

The increase in coal shipments in 1903 is equivalent to nearly 124%, and in coke about 24%, making a total increase of 113%.

Petroleum Developments.—The operations in the eastern oil fields during January, according to the Oil City *Derrick*, were as follows: Pennsylvania completed 547 wells, 158 dry, with a production of 4,920 bbl.; Ohio completed 322 wells, 20 dry, production 3,283 bbl.; Indiana completed 235 wells, 15 dry, production 3,328 bbl.; West Virginia completed 172 wells, 57 dry, production 2,591 bbl. This shows a marked decrease. Fewer wells were completed in January than at any time within the past eight or ten months. On January 31 the eastern and western oil fields contained 672 rigs

and 1,294 wells drilling. This was a decrease of 51 rigs and 148 wells drilling from the figures of December 31, 1903.

ARIZONA.

COCHISE COUNTY.

(*From Our Special Correspondent.*)

Calumet & Arizona. — The January output was 3,020,000 lb. of blister copper, 99% fine, nearly 150,000 lb. more than in any former month. Two 250-ton smelters are in blast and about 18,000 tons of rock were treated during the month.

Shattuck.—A syndicate from Duluth, Minn., has secured the six Shattuck-Costello claims, lying west and north of the proven field at Bisbee, for $1,100,000, though Mr. Shattuck retains a considerable interest. The purchasers will develop on their own account.

GRAHAM COUNTY.

Arizona Copper Co., Ltd.—The results for the year to September 30, 1903, show, after carrying to reserve, a sum of £50,000 for redemption of debt, replacement of capital outlay, etc., including £15,860 brought forward from the year before, a surplus of £267,378. After deducting the preferential dividends, amounting to £24,531, £242,847 is left. The directors resolved to recommend the payment of a dividend for the year of 12s. per share, free of tax, on the preferred ordinary and deferred ordinary shares. To account of this dividend 5s. 6d. per share was paid in July, and it is proposed that the balance of 6s. 6d. per share be paid on February 29.

CALIFORNIA.

AMADOR COUNTY.

Jose Gulch.—This property is near the famous Gwin mine. Good ore is being taken out and a mill is to be erected. The superintendent is W. E. Stewart, and secretary, E. G. Miller.

BUTTE COUNTY.

American Dredging Co.—This company has acquired the holdings of the Gold Garden Co., at Garden ranch, and will work by hydraulic elevator and then dredge.

Bloomer Hill.—This property has been bought by a syndicate, headed by John O. Rowan, of Helena, Mont. It is a large deposit of quartz about 16 miles from Oroville, and 20 men have been put at work on development. A 200-stamp mill will be required.

Blue Lead. — It is proposed to pump out some of the shafts of this mine at Bangor and prospect the old workings. If satisfactory a tunnel will be run. As some of the gravel is cemented, a mill will be put up.

CALAVERAS COUNTY.

Old Bum's Tunnel.—This property near West Point is being worked by W. W. Congdon, A. P. Lund and N. Schulz, who have a shaft sunk at the end of the 500-ft. tunnel. Much of the rock taken out is shipped and the free milling ore left on the dump.

Tillie Copopsy.—This mine near Double Springs, formerly the Hand Gill gravel claim, has been bought by miners of Paloma, with Louis Blais as superintendent. A shaft has been sunk 150 ft. and a new gallows frame is being put up.

EL DORADO COUNTY.

Havilah.—This mine at Nashville is to use electricity for lighting, for the air compressor and for running the 20-stamp mill.

Rio Vista.—A 30 ton smelter is being erected at this copper mine, and will be ready for operation by March 1.

Witmer-Fuller.—At this mine near Placerville the new five-stamp mill is now in working order.

HUMBOLDT COUNTY.

Big Bar Mining Co.—This mine at Orleans, on the Klamath river, is at present not in operation. A new board of directors is about to be chosen, when it is expected operations will be resumed.

Orleans Bar Gold Mining Co.—This company at Orleans Bar, H. DeC. Richards, manager, is now working three strings of sluices on a 40-ft. bench of gravel. New machinery and pipe is to be bought.

KERN COUNTY.

(*From an Occasional Correspondent.*)

A San Francisco company is unwatering the Big Blue ledge to reopen the mines on it.

A number of Los Angeles men are preparing to develop some promising discoveries some 12 miles south of Kernville, near the Kern River Co.'s canal.

Kern River Co.—The operations of this company have aroused interest in mining around Kernville. A number of placer locations have been made by members of the company. The locations have been grouped, and will be worked by several companies.

NEVADA COUNTY.

Douglas-Lacey Co.—The stockholders in the Gold Tunnel, Erie-Ontario and Potosi mining companies are being told that everything will be arranged to satisfaction of the creditors of this firm.

Grey Eagle.—Operations are to begin at once at this mine, Maybert, under Superintendent Henry Kaler. The mine has a good mill.

Murchie Consolidated Mining Co.—The trestle to the mill is practically finished and pipe will be laid to carry water from the hoist to the mill. The old Banner ditch is to be repaired.

Sierra Queen.—In this mine, D. L. Miller, superintendent, ore is being taken from the 330-ft. level to keep the 10-stamp mill busy.

SAN BENITO COUNTY.

Aurora.—This quicksilver mine near Hernandez, is shortly to start up with a full crew under superintendent B. I. Potter.

Stayton.—This quicksilver property, worked by Sidney Smith and others, has closed down and work will not be resumed until next spring.

SAN BERNARDINO COUNTY.

Southwest Missouri Mining Co.—This company was formed by several miners, who discovered a large ledge of copper ore near Ludlow, carrying about $3.50 gold and $11 silver per ton. The Ludlow Co. is developing water near by.

SAN DIEGO COUNTY.

Ranchita.—The large body of ore recently found in this mine at Banner, still holds out well, and the mill is kept busy crushing it.

SANTA BARBARA COUNTY.

Brookshire Oil Co.—This company, operating about eight miles south of Santa Maria, has struck oil at 1,900 ft. The property lies to the north of the Pinal company's ground.

SANTA CLARA COUNTY.

Chaboya Quicksilver Mine.—At this mine, formerly the San Juan, near San Jose, 20 men are at work. A good body of cinnabar was found recently in the old Mexican workings. The old reduction works are being torn down and a new plant constructed.

Watsonville Oil Co.—Well No. 3 of this company at Sargent is flowing about 350 bbl. daily, giving the company three wells, making 400 bbl. daily.

SHASTA COUNTY.

Afterthought.—At this mine, owned by the Great Western Co., the air compressor plant is completed and in operation and a Leyner drill is at work.

California & Detroit Mining Co.—The new $80,000 electric dredge of this company, replacing the one lost by fire, has been started up on Clear creek.

SIERRA COUNTY.

Balsam Flat Mining Co.—This company is about to purchase the Balsam Flat mine, near Alleghany.

Poker Flat.—A new 5-ft. ledge has been found in this mine near Poker Flat and four men are working on it.

SISKIYOU COUNTY.

New York.—At this mine, Indian creek, J. B. Scott, manager, electric power is used for mine and mill.

Sheba.—Fry & McAuley are doing considerable development work at this mine, Scott valley, and keeping the mill running.

Siskiyou Mining & Development Co. — The coal mine near Ager operated by this company has closed, as water could not be handled.

TRINITY COUNTY.

Chonchilula Gold Reef Mines Co.—This company, supposed to be operating the Miner's Dream claim, has practically quit what little work it was doing. The mill sent to Redding remains at that place and was never set up for work. Mark W. Musgrove is president. The stock was offered for sale by a New York agent, with the usual glittering promises.

TUOLUMNE COUNTY.

Jumper Gold Syndicate.—At this property, Stent, Mark B. Ker, manager, about 5,500 tons of ore are reduced monthly and when the new 20-stamps are in, 80 in all will be available. Ore is being taken from the Golden Rule mine owned by the company and now connected underground with the Jumper.

North Star.—Eight miners are doing development work in this mine, Strawberry valley, formerly the Onken, under Superintendent Gilmore.

COLORADO.

CLEAR CREEK COUNTY.

Morning Star.—A strike of rich ore is reported in this mine near Idaho Springs and power drills are to be installed.

New Era.—This tunnel at Freeland is in 1,200 ft. and producing ore to pay expenses. An agreement has been entered into between the New Era and Lone Tree companies for the extension of the tunnel through three full claims of the latter company on the same vein. J. R. Elgan is manager of the two companies.

Premier Gold Mining Co.—This company is said to be arranging to install machinery on its Conamara group, near Idaho Springs. W. H. Person is president and A. C. Freese secretary, with offices at Denver.

GILPIN COUNTY.

(*From Our Special Correspondent.*)

Alps.—Local parties are operating this property under a lease and maintaining regular shipments of milling and smelting ores and employ 20 men. They are hoisting from 1,300 ft. James Williams, Nevadaville, Colo., is manager.

Boston-Cleveland Mining Co.—This company, operating the Arizona and Morning Star properties at the head of Elkhorn gulch in Pleasant Valley district, has a shaft down 500 ft. and is running levels to open new ground. C. Morgan, of Idaho Springs, is manager. Some high grade ores have been taken out of surface workings.

Caledonia.—The New National Tunnel Co., which purchased this property, has installed a 12 h. p. gasoline hoist, is repairing the shaft and intends to sink the shaft now 400 ft. deep. G. Whitney Adams, Black Hawk, is manager.

Golden Dollar.—Operations on this property, in the Russell district, are resumed. The shaft is down over 150 ft. and is to be sunk several hundred feet deeper. A plant of machinery and a building were recently put up on the property. William Bradden, Russell Gulch, Colo., is to be in charge.

Kirk.—Arrangements are being made to resume operations on this mine, on Quartz hill, which has produced much gold and uranium ores. The deepest shaft workings are 225 ft.

Lilly.—A rich strike of silver ore is reported in this property near Black Hawk, by Fleiss Bros., Black Hawk.

Onoko Gold Mines Co.—At the annual meeting in Denver the following officers were elected: President, E. T. Butler; vice-president and general manager, William L. Shull; secretary and treasurer, Mark Postlewait, who, with O. W. Lowell and E. F. Stone, form the directors. The company operates a group of claims in Leavenworth gulch. The main shaft is down 220 ft. and sinking is to commence during February. W. L. Shull, Russell gulch, is manager.

Robert Emmet.—The Robert Emmet Gold Mining Co. has conveyed to the Stephens Investment & Trust Co. the Robert Emmet and

Virginia extension mining claims, on Maryland mountain, in the Gregory district, the consideration being $50,000. On account of the death of one of the owners the property has been operated only on a small scale recently.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

Production is again hampered by car shortage, owing to cold weather. The tonnage is averaging 2,200 tons daily of all classes of ore, largely iron and sulphides.

American Smelting & Refining Co.—The Arkansas Valley plant is running full blast. The sulphide mill is handling 300 tons daily.

Banker Mining Co.—At a special meeting the New York owners decided to raise $75,000 on first mortgage bonds, the bonds to be taken by stockholders only, and to resume work on the Banker mine.

Denver-Leadville Tunnel, Tramming & Mining Co.—This new project, to run a 3,200-ft. tunnel to connect Lake and Park counties, may secure European capital. Manager Shinn says he believes work will start by May 1. It is proposed to connect the tunnel with an electric tramway to Leadville, shortening the distance between Leadville and Denver 40 miles. The proposed bore will cut much undeveloped mineralized territory.

Little Louise.—Drifting is resumed on the vein. It is announced that a mill will be erected next summer.

McDougal Combination.—Eastern people have concluded a deal on this Alicante proposition. The milling ore will be handled by the Rhodesia Company.

Midas Mining Co.—Shipments are continuous from both the Midas and Coronado shafts, total daily output being 250 tons.

Ohio & Colorado Smelting & Refining Co.—The plant at Salida is running full blast and the 12 new roasters are working satisfactorily.

Wallace.—The railroads have built in a spur, and regular shipments start at once from the large iron bodies. Considerable new work is under way.

OURAY COUNTY.

Barstow.—The electrical machinery at the Bob Tail mill, near Ouray, is installed and the plant ready to operate. The mill is supplied with Wilfley tables and slimers, and the crusher is working. Twenty stamps are about ready and 20 more arriving.

Governor.—The tunnel is in about 800 ft. and 4 ft. of good milling ore is showing. The mine is in the Sneffles district, near Ouray, and work on the new mill begins when transportation opens.

J. I. C.—This mine in Payroll gulch, near Ouray, John Kennedy, superintendent, is closed down and will probably not resume till spring.

Tempest-Apex Mining Co.—The mill of this company, near Ouray, Frank Jackson manager, was started recently, and is expected to produce 40 to 50 tons of concentrates daily. Ore from the Mickey Breen is being worked, values running from $20 to $30 per ton in silver, copper and lead. About 26 men are employed, and power drills will be installed by May 1.

SAN MIGUEL COUNTY.

(*From our Special Correspondent.*)

Alta.—Sickness among the miners has prevented the force from being increased and kept down production. Manager A. C. Koch has been employing new men constantly, but several men have had to be brought to town each day to receive medical attention. Twenty stamps are dropping in the mill.

Keystone Placer.—At this mine, on the San Miguel river, about five miles below Telluride, operations will begin about March. The company has expended much time and money in preparing new equipment. During a run of 111 hours last November, $4,845 in gold was cleaned up, approximately about $44 per hour.

Liberty Bell.—Fifty stamps in the mill are dropping. Owing to a break in the tramway the mill was idle a few days, before which only 40 stamps were in operation.

Silver Bell.—The rich ore streak uncovered in the Ida vein, at Ophir Loop, is being developed, and the prospects become brighter. Milling will begin probably by the end of February.

Tomboy.—Work has been going on steadily; 10 additional stamps have started in the mill, making 50 now dropping. At present work is concentrated in the Argentine workings. About 250 men are employed in the mine, but changes are constantly made, new men being employed to take the place of inefficient ones let out. Mr. E. R. Atchison, who is in charge during the absence of Mr. Herron, desires to secure the most capable miners possible.

TELLER COUNTY—CRIPPLE CREEK.

(*From Our Special Correspondent.*)

Drainage Tunnel.—After passing the shaft of the El Paso mine, the breast of the tunnel has turned east. The Elkton and Mary McKinney mines are being unwatered rapidly. The flow from the tunnel is estimated at 6,000,000 gal. every 24 hours.

Empire State Co.—The lessees on the Orphan Bell claim have shipped some rich ore. They are in the Maloney workings.

Forest Queen.—J. K. Walsh has taken a lease on this claim, adjoining the W. P. H. Fourteen men are now employed in two shifts; machine drills are used.

Golden Cycle.—At the annual meeting in St. Louis the old directors were re-elected. The officers are John T. Milliken, president; H. McGarry, vice-president and general counsel; L. E. Hill, general manager; Louis Helm, secretary, and A. A. Rollestone, treasurer; directors, John T. Milliken, H. McGarry, Louis Helm, F. J. Campbell and F. L. Ballard. Some of the stockholders demanded the repudiation of the purchase last summer of the Aluminum and Fedora claims from John T. Milliken for $27,000 on the ground that Mr. Milliken made a profit in the transaction. They threaten litigation unless the deal be set aside.

Isabella.—An important step toward the consolidation of the Isabella and Empire State interests was taken in the election of a new directorate comprising H. C. Cassidy and W. H. Spurgeon, of the Empire State; Geo. N. Stone and K. R. Babbitt, of the Isabella, and Irving Howbert the fifth member. The new directors will meet as soon as Mr. Stone arrives from Chicago and elect officers. The selection practically ends the litigation against the Isabella company.

Portland Gold Mining Co.—At the annual meeting, held in Council Bluffs, Ia., on February 1, Jas. F. Burns, Irving Howland, Frank G. Peck, R. G. Shannon and Thos. F. Burns were re-elected directors. Mr. Burns was served with a notice of a suit, brought by John D. O. Haire, for the sum of $300,000, which he claims is due him for deals made by him in 1891-1892. A meeting for the election of officers will be held later in Colorado Springs. During 1903 Mr. Burns' report says development work was kept ahead of production, and over four miles of crosscuts, drifts, etc., were run. The total development up to January 1, 1904, is close to 27 miles of underground working. A statement of ore production, given by Frank G. Peck, secretary and treasurer of the company, shows a total of 90,245 gross tons, valued at $2,608,994, and a total since production began of 465,741 gross tons, valued at $18,081,542. Dividends during this time amount to $4,657,080.

IDAHO.

IDAHO COUNTY.

(*From Our Special Correspondent.*)

American Eagle Gold Mining Co.—This company, operating a new property in Elk City camp, Ida., has elected Denis Clark as manager. The company last year did 1,500 ft. of work.

Crackerjack.—The following officers have been elected: President, George K. Reed; secretary, Rufus Hawley; treasurer, W. W. Brown; manager, Frank Brown; directors, George K. Reed, James Witt, Rufus Hawley, W. W. Brown and James Witt. A partial test of the new electric plant at the mine shows it is working perfectly. In one crosscut 38 ft. of ore has been pierced, said to carry from $2 to $100 in gold.

Jumbo.—General Manager Frank Brown reports the clean up of the 14-stamp mill in Buffalo Hump for January was over $13,000 in gold bullion. Concentrates are estimated to be worth $4,500 more.

LEMHI COUNTY.

(*From our Special Correspondent.*)

Kittie Burton Gold Mines Co.—Thirty stamps are working on ore taken from the Ulysses claim, on Indian creek, at Ulysses, 35 miles from Salmon. The concentrates from the Wilfley tables are cyanided; R. L. Edwards is manager. The ownership is held in Houghton, Mich. The operations have proved quite profitable, but the close corporation gives no statements of profits.

SHOSHONE COUNTY.

Champion.—This property on Stevens peak, near Mullan, has been bonded to Patrick Burke for about $25,000. It is owned by a company, including Adam O'Donnell, Patrick Sullivan, George Turner, and F. C. Robertson and Fred Miller, of Spokane.

Snowstorm.—Twenty men are building the new tram, 7,200 ft. long, from the No. 2 tunnel, near Mullan, to the Larson railway spur. When it is done the company expects to ship coppper ore. The ledge uncovered in No. 2 tunnel at 400 ft. depth is 40 ft. wide, and 3 ft. of it is said to carry ore running 12% copper and over.

Standard.—The slime experiments under way at this mill, near Wallace, for two months have been completed, and it has been decided to supersede the canvas plant with standard Wilfleys and 4 ft. Frue vanners. Eight of each machines will be installed.

INDIANA.

DAVIES COUNTY.

(*From Our Special Correspondent.*)

Ragsdale Coal Mining Co.—This company has been organized with principal office in Washington, Ind. The directors are Lon. Ragsdale, William Dillard, George Kramer and Thomas Winterbottom. The company has leased 160 acres of coal land and will open a shaft in a short time. The coal is of good quality and seven ft. thick.

KNOX COUNTY.

(*From Our Special Correspondent.*)

Vulcan Coal Mining Co.—This company, of Indianapolis, has leased 232 acres of coal land near Bicknell for a period of 50 years, with the privilege of buying the land. The company was recently incorporated. Shaft sinking will begin at once.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

(*From our Special Correspondent.*)

Atlantic.—This mine produced 294¼ tons of mineral in January.

Baltic.—The January production was 698 tons of mineral.

Calumet & Hecla.—Diamond drill work is under way 725 ft. west of No. 20 shaft.

Centennial.—Much of the surface plant at the old mine on the Calumet conglomerate will be moved several hundred feet east to the Kearsarge shafts. The opening of No. 2 shaft to surface will be completed.

Quincy.—This mine made 601 4-5 tons of mineral in the 14 days it worked during January. Work was resumed February 3, the trammers agreeing to a reduction of $1.50 per month in wages.

Tamarack.—Production from No. 2 shaft has been suspended to permit the timbering being repaired.

Trimountain.—The January production was 595 tons of mineral.

Winona.—The output for January was 41¼ tons of mineral.

Wolverine.—This mine produced 502½ tons of mineral in January.

COPPER—KEWEENAW COUNTY.

(*From Our Special Correspondent.*)

Miskwabik.—Drifting on the 125-ft. level is under way; sinking is discontinued. Capt. James Chynoweth is acting in an advisory capacity, Capt. Thomas Rapson being superintendent.

Mohawk.—The new Nordberg hoist at No. 4 shaft is in commission. Rock shipments are going to the stamp mill. There will be no increase in output until next month. The January output was 375 tons of mineral.

Phoenix Consolidated.—The rock stamped is said to average between 30 and 40 lbs. of mineral per ton and a considerable large amount of mass and barrel rock is produced. Recently a 7-ton mass was taken out.

COPPER—ONTONAGON COUNTY.

(*From Our Special Correspondent.*)

Adventure Consolidated.—Rock shipments average 325 tons daily. Work is confined to No. 3 shaft, down 750 ft., which is to go to 1,000 ft. unless the lode shows marked improvement. Capt. Thomas Dennis, who resigned as superintendent, is in charge, awaiting the appointment of his successor.

Mass Consolidated.—This mine produced in January 155 tons of mineral; 75 tons were mass and barrel copper, which went direct to the Quincy smelter. The mill stamped 6,450 tons of rock, which averaged 1.3% mineral, exclusive of mass work.

Michigan.—The production in January was 109 tons of mineral, 43 tons of which were mass and barrel copper.

IRON—MARQUETTE RANGE.

(*From Our Special Correspondent.*)

Lake Angeline.—These mines at Ishpeming shipped 301,932 tons during 1903.

Lillie.—This mine at Negaunee, operated by the Republic Iron & Steel Co., opened a new vein of ore recently in the sixth level. The drift is now in about 100 ft., and two shifts are being worked in that part of the mine. A drift has also been extended from the eighth level about 400 ft., with a raise leading to a point directly opposite the sixth level.

Maas. — The shaft of this Cleveland-Cliffs mine, at Negaunee, is 85 ft. in the ledge. Two 1,400-gal. Prescott pumps are to be installed, but ore cannot be taken out before 1905.

Tesora Mining Co.—This company, backed by Minnesota men, has a diamond drill working at the old Taylor mine, a few miles south of L'Anse. A second drill will be added soon.

MINNESOTA.

(*From Our Special Correspondent.*)

Average vessel cargoes loaded last year at the ore docks of the Duluth, Missabe & Northern road at Duluth were 6,000 gross tons, or 2,000 tons more than the average four years ago. Average cargoes loaded at the docks of the Great Northern and Duluth & Iron Range roads were above any previous year's records. It looks as though the bulk of Minnesota ore shipments for the coming years would be from the Duluth, Missabe & Northern docks, as that road controls the United States Steel Corporation's traffic from the Hibbing district and from other Mesabi range mines as far east as Eveleth. The Duluth & Iron Range is the only line to the Vermilion range, shipments from which may be figured as averaging 2,000,000 tons per annum for many years, and all the eastern Mesabi mines. Its three largest mines on the latter range are Fayal, Biwabik and Stephens. The Great Northern has been surveying for a line along the western Mesabi to the Mississippi river, running through several townships where some lean ore has been found, but the construction of this proposed line is indefinitely postponed. The company has completed a cut-off around the Hibbing ore basin. The Duluth & Iron Range is doing no new construction and is buying no rolling stock or equipment; the Duluth, Mesabi & Northern is relaying with 80-lb. rail its main branches, and is constructing spurs to the Higgins, at Virginia, and the Clark, Chisholm, Morris, Monroe and Niles mines, in the eastern part of the Hibbing district.

The cut in wages by the Oliver Iron Mining Co. and Minnesota Iron Co. is for miners to $1.60 a day for surface labor and $2.10 for contract miners. The latter will earn possibly 7 to 10% above schedule. Underground labor gets a little above surface. Steamshovel men will probably go on a $30 basis in the spring, and dinkey runners $75 to $80 a month. Office help, especially the good men, have not suffered severely. In the office of the Pittsburg Steamship Co. all men in the accounting department at Duluth have been discharged from February 1. No change has yet been made in the United States Steel's two Minnesota railways, either in force or pay. These two roads last year earned gross, from ore alone, about $8,750,000.

IRON—MESABI RANGE.

(*From Our Special Correspondent.*)

Genoa Iron Co.—This company is testing the ground under the village of Sparta with two drills, and will add a third in a few days. It is reported that the work is extremely satisfactory, and that a large ore body is liable to be met necessitating the removal of the village. The mine has been working double shift since the close of navigation, but is likely to cut out the night crew shortly, reducing the force by 100 men. There is a good deal of ore in stock. Genoa is the property of the United States Steel Corporation and is an underground mine.

International Harvester Co.—This company's Hawkins mine, in section 32, T, 57, R, 22, is to resume in March, with a full force. The Agnew mine is being stripped for milling, and a small force is employed underground.

Jordan Mining Co.—This company is exploring its ground near Hibbing in order to increase its proved tonnage if possible. When Corrigan, McKinney & Co. took this mine it was explored to show about 1,200,000 tons, and was apparently a tongue from a larger deposit.

Monroe.—At this mine of the Oliver Iron Mining Co., three shafts are sinking to the depth of 125 ft., where the first level will be started. They are down from 35 to 70 ft. A fourth shaft is to be sunk. This mine is being stripped rapidly for milling. Quicksand met in sinking has bothered the company and 100 men are stripping with two steam shovels.

Republic Iron & Steel Co.—This company is hoisting about 750 tons a day from three Mesabi range mines. Four are idle, including Union, which is 50% in ownership of the United States Steel Corporation through the American Steel Hoop. Kinney, also idle, is a stripping property, which will be mined this year. Wills, a small mine, may not be active for some time.

IRON—VERMILION RANGE.

(*From Our Special Correspondent.*)

A thousand men are employed in the mines of the Oliver Iron Mining Co. at Ely, the only active point on the range. Of these, 375 are at the Pioneer, 300 at the Chandler, which are both working 20 hours, and 325 more at the Sibley, Zenith and Savoy, which are idle nights. About 5,000 tons of ore daily are coming up, and stockpiles are growing to immense proportions. At Pioneer the shafthouse now going up is similar to those at Sibley and Savoy and will be 160.5 ft. high, and of steel. It is to be equipped with a 1,000 h. p. engine, now on the ground, taking steam in a fireproof building from water tube boilers. This shaft is expected to hoist 100,000 tons a month. It is lined with steel and has steel skipways. It has been under construction three years and is nearly 1,000 ft. deep.

Explorations by the Roy Iron Co., an association of French miners and others of Duluth, which have been carried on for some months on the Roy land, near Tower, are claimed to have cut 100 ft. of good ore.

MONTANA.

BEAVERHEAD COUNTY.

(*From Our Special Correspondent.*)

Indian Queen.—The Western Mining Co., which is operating a matting furnace at this mine, on Birch creek, will build a 100-ton furnace in the spring. The present furnace has about one-half that capacity. The matte contains from 55% to 60% copper, and is shipped to Butte. Heavier mine machinery is to be placed and the shaft will be sunk to reach the sulphide ores. The ore now mined is from the carbonate zone.

Midnight.—H. L. Hayes, of Butte, and associates have secured from James A. Murray a lease and bond on this mine, at Argenta. The property has produced about $200,000 from the 250-ft. level and above, but has not been worked in some years. There are several thousand tons of second-class ore on the dump, the aggregate value of which is said to be $75,000. This tonnage will probably be treated by cyanide. The ore is principally an iron oxide.

DEER LODGE COUNTY.

Washoe Smelter.—This plant at Anaconda is working full blast. Every 24 hours about 6,000 tons of ore are concentrated and smelted. About 3,000 men are employed in the various departments, and in the course of several months, when the arsenic saving plant is in operation, employment will be afforded more.

FLATHEAD COUNTY.

(*From our Special Correspondent.*)

Kintla Lake Oil Field.—There is renewed activity in looking for oil. Two companies are at work and others are getting ready. The Kintla Lake Oil Co. is said to be averaging 30 ft. a day with its present well. The Butte Oil Co. has had considerable trouble with the well it is putting down. The indications are that the wells will have to be sunk 2,000 ft. or more.

JEFFERSON COUNTY.

(*From Our Special Correspondent.*)

Golden Gate.—At this mine a massive iron pyrite is mined and shipped to the new Pittsmont smelter, at Butte. The ore carries an iron excess of 35% and better, with from $8 to $10 in gold. The ore is desirable for the sulphur content. The works are taking it at point of rail shipment and paying $2 a ton for the iron and 90% of the gold, no charge being made for treatment. Joe Garreau, of Clancy, is operating the property.

McCabe and King.—A. N. Bird, representing Clarence McCornick, of Salt Lake, has purchased the McCabe one-third interest in 39 mining claims near Wickes and Corbin, comprising the Wickes and the O'Connell groups. Two mining companies, to explore the ground by deep shafts, will be formed. One is to be known as the Jefferson Copper Mining Co., and the other as the Corbin Copper Mining Co. Ample funds are to be provided to explore the ground. McCormick, Bird and King hold the title. The headquarters of the companies will probably be in Salt Lake.

New York & Montana Copper Mining Co.—This company has been organized to develop the Erickson, Copper Gulch and Sciota groups, and a half interest in the Nash Ranch, comprising about 250 acres all told. The property is in the Colorado district, near Corbin and Wickes, and is part of the property acquired during the past 18 months by J. A. McCabe and associates. The Guggenheims, E. O. Nash and D. M. Hyman are said to be interested, with E. J. Mathews, of New York, as manager. J. A. McCabe retains 66,000 shares of the stock. The company is capitalized at $1,000,000 in $1 shares. Two shafts are being sunk, to reach 500 ft. each before cross-cutting starts. About 50 men are employed.

Robert Emmet.—This group of four patented claims, on Boulder slope of Wickes hill, has been secured under a bond and lease by J. A. McCabe and associates, who will put on machinery and sink a deep shaft. In the early days of quartz mining the surface ore was found to contain enough silver to stand a haul by bull teams to Corrine, Utah, whence it went by rail to the seaboard, and thence to Swansea, Wales, for treatment. When the shaft reached the sulphide zone the ore turned to copper, and the property was abandoned as far as active work was concerned. It can possibly be opened up profitably, for the copper-silver contents of the deep ore bodies known to be in the ground.

MADISON COUNTY.

Carpenter.—This property, near Rochester, is being worked by two sets of leasers, C. B. Ward and Carpenter & Miller, who are reported shipping high grade ore.

Monitor.—This mine, near Rochester, is under lease and bond to W. McClay, J. Carter and W. McKay. There is a 50-ft. shaft and 20-ft. crosscut completed, the later said to be all in ore.

Oregon.—Chas. Wiedeman has 10 men taking out shipping ore. The new mill will not be completed until spring. The mine is near Pony.

NEVADA.

NYE COUNTY.

(*From Our Special Correspondent.*)

Crystal Water Co.—This company, which furnishes water for domestic purposes to the camp from wells 4 miles north of Tonopah, has contracted with the Halifax Mining Co. for it swater, pumping it from the 600-ft. level, where a station is being cut and a sump of 50,000 gal. capacity. It will install a Dow pump having a capacity of 300,000 gal. per day. At present 50,000 gal. per day are raised by a No. 7 Cameron pump to a surface tank and then forced by a Hooker pump 3,000 ft. and up 170 ft. to a reservoir with a capacity of 130,000 gal., from which the water is piped 8,000 ft. to the 10-stamp mill, where it costs $2.50 per 1,000 gal. The water in the Halifax mine has a temperature from 60° to 70°.

Tonopah Extension Mining Co.—This company, owning three claims on the western boundary of the Tonopah Mining Co., has sunk a shaft 375 ft. and at 227 ft. cut a vein assaying $235 per ton. At 275 ft. this vein is being opened, proving it to be 5 ft. wide and assaying from $300 to $500 per ton. Ore is being sacked for shipment. This is probably the western extension of the Mizpah vein. The principal stockholders in the company are Chas. M. Schwab, Dr. M. R. Ward, Thomas Morrison and Robert C. Hall, all of Pittsburg, and John McKane, Tonopah, president and general manager. The mine, which is equipped with a 50-h. p. steam hoist, is one of several properties now being developed by the same parties who own 13 claims adjoining it.

OREGON.

BAKER COUNTY.

Oregon Smelting & Refining Co.—The smelter at Sumpter made a two weeks' test run recently and is being improved. The maximum capacity is said to be about 150 tons per 24 hours, but it is not expected to run steadily before June, when the expected railroad extension will be available. The furnace is 38 by 148 in. at the tuyeres. Blake crushers and Snyder samplers are used and the sampling mill has a capacity of 700 tons per day. E. W. Miller is general manager and Carr B. Neal superintendent.

Red Boy Consolidated Gold Mines Co.—Judge Robert Eakin, in the suit of O. O. Benson against this company, has ordered the sale of the Red Boy property. The indebtedness is approximately $58,000 and no bid less than $80,000 is to be considered.

United Exploration Co.—This company, of Sumpter, has placed an order with the Allis-Chalmers Co. for an electric hoisting plant with a capacity of 2,000 ft.

JOSEPHINE COUNTY.

American Gold Fields Co.—Much machinery is being installed by this company owning the Granite Hill mines, Louse creek, near Grant's Pass. An Ingersoll-Sergeant compressor has been installed, also a hoist, and the mill is expected to be in operation before March. W. J. Murphy, of Chicago, is general manager.

Lucky Queen.—New owners are at work on this old quartz property, near Grant's Pass, with C. D. Crane in charge of the crew. New buildings are being erected and ore cars, hoists and machinery being installed to work the mine at depth.

Sturgis.—This hydraulic mine, near Grant's Pass, owned by S. A. Vance, of Los Angeles, Cal., is to be equipped with two giants, an electric lighting plant and a telephone system. W. R. Olmstead is manager.

Vulcan.—A new Merrill mill is installed at this mine, at Placer, power to be supplied by a 52-in. Pelton wheel. A crusher, Wilfley concentrator and other machinery are on hand.

PENNSYLVANIA.

ANTHRACITE COAL.

Jermyn No. 2—Owing to the mine workings settling at this colliery, Old Forge, 600 employees were temporarily rendered idle.

Philadelphia & Reading Coal & Iron Co.—Work on the new Bear Valley shaft, at Shamokin, was started by this company recently. It will be sunk 800 ft. and when completed will furnish employment to 400 men and boys.

Storrs.—An explosion resulted in the death of a fire boss at this mine of the Delaware, Lackawanna & Western Co. Miners entered workings where gas had accumulated in direct violation of orders.

Wentz & Co.—This firm is sinking a 4-compartment shaft on the tract recently acquired at Tuscarora. A new breaker, it is reported, will be erected next summer and the output expected to be 800 tons per day.

BITUMINOUS COAL.

Ellsworth Coal Co.—The 1,500 non-union coal miners employed at the four mines of this company, at Ellsworth, who were notified February 1 of a cut in wages, have struck. The company is the second largest independent concern in the district and has always employed non-union men.

Kimler Run Coal & Coke Co.—This company is making openings at Hopewell, Bedford county, where it has purchased several coal tracts and will build 50 coke ovens.

Somerset Coal Co.—The strike at this company's mines, near Meyersdale, is reported to be practically ended. The company is mining all the coal it can sell and employs non-union miners.

SOUTH DAKOTA.

CUSTER COUNTY.

(*From Our Special Correspondent.*)

Minnie May Mining Co.—Work is suspended until spring.

LAWRENCE COUNTY.

(*From Our Special Correspondent.*)

Lexington Hill Gold Mining Co.—Hermann Bischoff, of Deadwood, succeeds E. F. Woodworth as general manager, and T. T. Cornforth as chairman of the executive board. Mr. Bischoff is in Deadwood. At a recent meeting of the directors in Boston, it was decided to erect a new 40-stamp mill and to convert the 20-stamp mill into a concentrating plant. Wilfley tables will be put in soon.

Horseshoe Mining Co.—The 500-ton cyanide plant and mines are working again full blast. Edward Manion continues as mine foreman, and David Ellis, of Deadwood is assistant. G. H. Clevenger has charge of the cyanide mill.

PENNINGTON COUNTY.

(*From Our Special Correspondent.*)

Black Eagle Gold Mining Co.—This company has been formed to purchase the Black Eagle group. Edward McConnell, of Logansport, Ind., is president; Frank Beach, of Logansport, Ind., secretary and treasurer, and H. E. Fisher, Rochford, S. D., mine superintendent.

Cumberland Gold Mining Co.—The old J. R. shaft is being unwatered. The shaft is 260 ft. deep. F. C. Crocker, of Hill City, is manager.

Golden West Mining Co.—A saw mill has been purchased to cut lumber for surface buildings. The company will erect a Chilean mill, and cyanide the tailings.

Gopher Mining Co.—Fire has destroyed the Lena shafthouse and the 100 h. p. gasoline hoist, the air compressor and the pump. The miners had difficulty in escaping. The plant will be replaced.

Ivanhoe Gold Mining Co.—The new machinery is in position, and sinking has been resumed.

Lakota Mining Co.—Lumber is being sawed for the new mill, and shaft house. The company has torn down the old Grizzly Bear mill to make room for the new plant.

Mainstay Gold Mining Co.—A test run is being made at the Bismarck mill with five stamps.

TENNESSEE.

ANDERSON COUNTY.

Coal Creek Co.—At the mines of this company, near Coal Creek, four men were killed on February 6 in an encounter between striking miners and guards who were protecting non-union miners from assault.

UTAH.

BEAVER COUNTY.

(*From Our Special Correspondent.*)

Majestic Copper Co.—Orders have been issued to stop all development work. It is believed the suspension is temporary, pending an adjustment of the finances.

Monarch Mines & Smelters Corporation.—A. B. Lewis announces the formation of this company, with a capital of $30,000,000. It has for its basis a consolidation of the Comet, Imperial and Royal copper properties, the Manhattan and Pioche Consolidated at Pioche, Nev., and the Last Chance mines at Bingham, Utah. The merger may also include the Majestic properties.

JUAB COUNTY.

(*From Our Special Correspondent.*)

Tintic Shipments.—During the fiscal week ending February 5, 129 cars of crude ore and 2 cars of concentrates were sent to Salt Lake smelters, as follows: Uncle Sam, 2; Yankee Consolidated, 2; Tetro, 3; Centennial-Eureka, 48; Eagle & Blue Bell, 4; Bullion-Beck, 6; Gemini, 6; Lower Mammoth, 9; Grand Central, 22; Victor Consolidated, 2; Carisa, 3; Ajax, 2; Dragon Iron, 11; Martha Washington, 5; South Swansea, 1; La Clede, 1; Star Consolidated, 2; Uncle Sam (concentrates), 2.

Mammoth Mining Co.—At the annual meeting in Salt Lake, Samuel McIntyre, Sr., was elected president, Samuel McIntyre, Jr., vice-president, and R. M. Wilkinson secretary, who, with Thomas W. Jennings, A. B. Sawyer, J. A. Cunningham, Jr., and F. D. Clift, constitute the directors. Owing to smelter charges not being satisfactory, the mine was operated only about six months of the past year and 13,573 tons of ore marketed, bringing $145,453, while revenue from other sources aggregated $156,040. The disbursements were $130,460, leaving a net profit of $25,461. The secretary's books showed an overdraft January 1 of $49,537.

SALT LAKE COUNTY.

(*From Our Special Correspondent.*)

Bingham Consolidated Smelter.—Copper bullion shipments week ending February 5 aggregated three car-loads, about 181,000 lb.

Ohio Copper Co.—The concentrator is running successfully and turning out a product of about 27% copper.

United States Smelter.—Shipments of copper bullion during the fiscal week ending February 5 amounted to four car-loads, 238,437 lb.

Utah Consolidated Smelter.—Copper bullion shipments for the fiscal week ending February 5 amounted to five car-loads, 300,525 lb.

Utah Copper Co.—The machinery of the new 500-ton concentrator is installed. The management states the plant will go into commission about February 20.

TOOELE COUNTY.

(*From Our Special Correspondent.*)

Sacramento.—During January this property produced 77 flasks of quicksilver.

WASHINGTON.

FERRY COUNTY.

(*From Our Special Correspondent.*)

Ore Shipments.—For the week ending January 27 the ore shipments from Republic, amounting to 780 tons, were as follows: Mountain Lion to Trail, 290; Quilp to Granby, 300; Nob Hill to Granby, 130; Morning Glory to Tacoma, 30, and from the Blue Horse, 30 tons.

Belcher Mining Co.—President D. F. Anderson and two shareholders were recently at the mine. A trial shipment of ore is to be tested by the Hendryx process, and a car load will go to the Granby smelter. The ore has to be hauled six miles to the railroad.

Golden Eagle.—The shaft is down 275 ft. Possibly the shaft has entered the hanging wall of the Quilp vein.

Iconoclast.—A drift from the shaft, near Keller, on the 200-ft. level cut 2.5-ft. of good ore.

Malachite.—On the Vesuvius claim, near Keller, a new open cut across the vein disclosed 5 ft. of solid arsenical iron, without gangue of any kind. A shaft is down from the bottom 6 ft. in the same material.

Morning Glory.—Three men are getting out a little rich ore.

Mountain Lion.—The battery at the mill has been overhauled, the stamps reshod and a battery storage tank set up. A Hendryx agitating tank is installed and the mill will soon be ready to run on the Hendryx process.

Nob Hill.—Two 10-hour shifts, 18 men in all, are now employed. A raise on the ore shoot is up 40 ft. The lessees are making money.

Zala M.—The mine and all machinery have been leased for two years. The lessees have agreed to ship ore and keep up development work.

FOREIGN MINING NEWS.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—For the week ending January 30 shipments amounted to 18,000 tons, as follows: Granby, 11,370; Mother Lode, 4,288; Emma, 1,220; Oro Denoro, 1,023; Senator, 66; Athlestan Jackpot, 33. Total for the year to date, 65,757 tons. The Granby smelter treated 13,655 tons during the week, making a total for the year of 50,061 tons.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—For the week ending January 30 shipments aggregated 8,750 tons, as follows: Le Roi, 4,890; Centre Star, 1,320; War Eagle, 1,230; Kootenay, 240; Jumbo, 320; Le Roi No. 2, 420; same (milled), 30; total for year to date, 40,568 tons.

Giant.—An order has been granted in the Supreme Court appointing A. B. Mackenzie, of Rossland, receiver for this company. This is part of the prayer of the writ issued by the South African Ventures syndicate on behalf of itself and other mortgage debenture holders. The writ also asks for the sale of the property to satisfy these creditors.

ONTARIO—ALGOMA DISTRICT.

(*From Our Special Correspondent.*)

Shakespeare.—A 20-stamp mill will be erected on this property at Webbwood, 100 miles east of Sault Ste. Marie, which is being explored by Brainerd and Duluth, Minn., men. An air compressor and other machinery have been ordered and a shaft is going down. The projectors are quite sanguine.

Williams Iron Co.—This company, which has land at Loon Lake, 40 miles north of Sault Ste. Marie, has let a contract for 2,000 ft. of diamond drilling to R. W. Seelye and O. B. Willmott, formerly with the Algoma Commercial Co. Loon Lake has already shown a considerable quantity of silicious specular hematite.

MEXICO.

SONORA.

Greene Consolidated Copper Co.—At the meeting in New York on February 10 it was voted to increase the capital stock from $7,200,000 to $8,640,000, or by 144,000 shares, par value $10.

President Greene said that the January report showed: Operating expenses, $392,000; output, 5,111,000 lb., at a cost of 12c. per lb.; actual cost between 7 and 8c. at the mines; $84,000 went into investment account; total cost of making copper in the four months ending November 30 was about 10⅛c. per lb.

NEW ZEALAND.

The Mines Department reports the exports of gold and silver, for the 11 months ending November 31, as below, in ounces:

	Gold—		Silver—	
	1902.	1903.	1902.	1903.
November	25,515	48,218	56,852	84,689
Eleven months	398,362	449,405	550,905	801,200

For the 11 months the increase in gold was 51,046 oz.; in silver, 250,295 oz. The gold bullion reported in 1903 was equal to 403,815 oz. fine gold, or $8,346,850. The greater portion of the silver was obtained from the mines in the Hauraki mining district.

MINING STOCKS.

(Full quotations given on pages 265 and 266.)

New York, Feb. 10.

The echo of war between Russia and Japan has been heard by Wall Street, and, coupled with the disastrous fire in Baltimore, has naturally hurt the stock market. With few exceptions prices have broken.

Amalgamated Copper has fallen with the other industrial stocks, losing over 5 points, to $43.125 in a few days. Simultaneously Anaconda dropped off over 4 points, to $16.06, but trading was not enormous. On curb, Greene Consolidated of Mexico again has the center of the speculative stage, because there are two factions that have individual plans for liquidating the company's indebtedness. A settlement of the dispute is expected at to-day's stockholders' meeting. The stock has sold at $11.25@$10.50, while rights on the proposed issue of new capital changed hands at $45@$25. British Columbia showed small sales, at $2.75; while rights to new stock in the Snow Shoe consolidation sold at $2.50. White Knob, of Idaho, moved at $7@$6.50.

A sale of Ontario silver, of Utah, is reported at $4.50.

Cripple Creek, Colo., stocks are higher, Elkton Consolidated advancing to 60c.

Comstocks are still feeding on Ophir's "prosperity," that stock having again touched $4.

Boston. Feb. 9.

(*From Our Special Correspondent.*)

It has been a generally dull and sagging market for mining shares the past week. There has been but little news, although what there has been is of a favorable character, so far as individual properties are concerned. The weakness in the metal market retards or dispels any attempt to take on stocks until a clearer view can be had of the general financial situation. The uncertainty surrounding the Far East and the calamity in Baltimore created a general selling movement Monday, and stocks dropped from $1 to $3 on that day alone. To-day the market seems to have steadied, but the recovery is undoubtedly due largely to short covering. It cannot be denied that the action of Amalgamated Copper, since the favorable Montana decision a week ago, has been disappointing, and a great many people have stock on hand taken at considerably higher prices. From the price made in this market of $53, the stock fell $10 to $43, with a $2 rally subsequently. Copper Range also dropped $5.25 to $39, with $1.50 recovery. Calumet and Hecla dropped $25 to $435, with a $5 recovery. Utah Consolidated also slid $3.375 to $30.125, with recovery to $31.875.

Osceola was pressed for sale moderately, which drove the price down $7 to $53, with a subsequent sale at $56; and Tamarack fell $13 to $100. Parrot, which made a phenomenal advance to $29 last week, fell back to $21, recovering to $23. Bingham went off $2 to $20, with $1 recovery. No definite action has been taken by the Bingham directors relative to raising the needed funds. Mohawk fell $2.625 to $34.125, with a slight recovery. Centennial dropped $1 to $14, with subsequent recovery, and United States ran off $1 to $19.75, recovering to $20.50. Isle Royale sold at $7.25 today, and Old Dominion rose from $9.25 to $10. Wolverine is off $3 to $70, and Dominion Coal settled $2 to $59.

There have been rumors of another assessment by the Adventure Mining Co., but as the company has some $100,000 on hand the fallacy of the rumor is seen. A $5 assessment has been levied by the Ahmeek Mining Co. on the 50,000 outstanding shares, payable $3 February 25 and $2 June 24. This is not a listed stock, being traded in on the curb.

Colorado Springs. Feb. 5.

(*From our Special Correspondent.*)

The past week has seen a lull on the local exchange, due to the unusual activity of the week previous. Trading, however, has been good compared to what it was a month ago. During the past two days prices have shown a tendency towards weakness. This, however, is unwarranted, as the producers in the Cripple Creek district are in better condition than ever before. Isabella, Elkton and Portland were the features of the market, all gaining in price with heavy sales. Isabella advanced from 12 to 20, but declined to 18c. Elkton followed suit, advancing from 57 to 60c. The last sale of Portland prior to the current week, was made at $1.60 per share. Yesterday sales were made at $1.95, and the stock closed strong. Aside from the above the market has been featureless.

San Francisco. Feb. 4.

(*From our Special Correspondent.*)

The speculation in the Comstocks has been slightly less active. The over-booming of Ophir has been followed by something of a collapse. Stocks were freely sold at lower prices, in the absence of any considerable demand to buy. Ophir itself sold down as low as $3.70@$3.50, and there was not any considerable support. Consolidated California & Virginia closes around $1.60; Mexican, $1.50; Hale & Norcross, 70@75c.; Sierra Nevada, 63c.; Savage, 50c.; Gould & Curry, 32c.; Potosi, 23c. per share.

On the San Francisco and Tonopah exchange trading was active, and sales rather liberal. Fluctuations were moderate, however, and, while there was no falling off in prices, there was no marked rise. Montana Tonopah brought $1.40@$1.50; Tonopah Belmont, 70@75c.; Tonopah Midway, 41c.; Paymaster, 14c. per share.

On the California exchange sales were moderate only, but prices were fairly steady. Home brought $1.15; Monarch, 38c.; Oil City, 33c., and Toltec, 18@20c. The heaviest dealing was in Toltec and Monarch. Total sales for the month of January were 84,507 shares, valued at $31,389.

San Luis Potosi. Feb. 2.

(*From Our Special Correspondent.*)

Eight of the companies that started operations around El Oro and Tlapujuhua have closed down, having exhausted their working capital, and found collection of assessments difficult.

Exchange on New York during the week dropped from 225.75, on Monday, to 222.75 on Saturday. The government has announced 223 as the rate duties will be figured on, and 223.90 the average of the first 25 days in January, 1904, for purchase of gold, making one gram equal to $1.512 Mexican silver.

Eighteen of the Mexican companies, making public announcement of their dividends, paid an even $750,000 Mexican.

All stocks remain low. Victoria (El Oro) brought $160; Dos Estrellas, $18.25; Aldebaran, $30; Old Abe, $5; Luz de Borda, $55; La Union, $54; La Paz, Matehuala, $167; Santa Gertrudis, $81.5, and Sorpresa, $305.

COAL TRADE REVIEW.

New York, Feb. 10.

ANTHRACITE.

The anthracite trade shows the stimulating effects of cold weather. Retail buying is brisk at all points, and while wholesale buying shows little change, inquiries from dealers indicate that there will be a lot of coal taken before long to replenish stocks depleted by an unusually severe winter. It appears that the shipments from the mines in January were 4,134,235 tons, compared with 5,934,950 tons in January, 1903. The production this year was bound to be less than the record-breaking output of last year, but is still of good size. Since the settlement of the Red Ash strike the anthracite regions have been without serious labor troubles. Should a strike come in the bituminous regions affected by the interstate agreement, it is altogether likely that the anthracite miners will keep at work, inasmuch as the bituminous miners worked during the anthracite strike of 1902.

In the Northwest, cold weather has affected wholesale as well as retail buying. The movement of coal from the docks, however, has been hampered by snow storms. It is thought that supplies on docks will be cleaned up by the opening of navigation. In Chicago territory conditions are about as they have been, with retail buying good, and wholesale hardly as strong as might be expected. Egg and stove sizes are reported in best demand, though nut

is also wanted. The outlook is that, by the opening of navigation, dock supplies, heavy as they were, will be cleaned up. Along the lower lakes and in Canadian territory there has been much difficulty in forwarding coal on account of heavy snow storms, and some points have actually been in want. Conditions between Buffalo and Chicago have been particularly bad; in fact, the worst in many winters. The Grand Trunk railroad has been blockaded by drifts in Canada, and deliveries of coal were for a time impossible, cars being stalled all along the line. In the all-rail trade farther east business is good, and deliveries have been less restricted by storms. Along the Atlantic seaboard the markets continue on a weather basis. Buying at New York is excellent; at Boston, where retail buying has been brisk all winter, reports now are that there will soon be a considerable increase in wholesale orders. Sales agents at New York report that stove and chestnut sizes are in especially strong demand, as are the steam sizes. The movement of coal at New York harbor points is again troubled by ice in the slips.

BITUMINOUS.

The seaboard bituminous market continues quiet, and mine tonnages have been curtailed considerably. There is still plenty of coal arriving at tidewater to take care of all the business offered. A meeting of the trade is set for to-morrow, at the Waldorf. It is expected that enough information will develop at this meeting to give an idea of what the contract prices will be for the coming year's business. There seems to be a feeling that the main line roads will not reduce through freight rates.

It is reported that contracts have already been taken for something over 500,000 tons. The prices named are hard to get at, but it is rumored that they were under $2.25, f. o. b. Norfolk and Newport News. The present outlook is for a quiet year, with a strong probability that a lot of small operators, who, tempted by the high prices of the past two seasons, have gone in on borrowed money, will be wiped out before next January.

The deadlock between miners and operators in the central West affects districts shipping to seaboard somewhat, as some mining companies have agreements with the Miners' Union, which agreements are based on the wage scales established at Indianapolis. At present the strikes that have been declared in districts shipping to tide water are of no moment, on account of the quiet market.

Trade in the far East is quiet, and is still somewhat disorganized by not receiving all the coal it can handle by tide, but by all-rail shipments. The trade cannot make calculations on these rail shipments as yet, but the matter will probably remedy itself when business gets brisk in midseason, and the cars now used for long hauls will be needed for shorter hauls, which will pay better on account of quicker trips. Along Long Island sound demand is dull, and less than the usual proportion of tonnage is going to that territory. At New York harbor trade is quiet, regular consumers taking somewhat less than their usual allotments. In all-rail territory the tonnage taken shows little change, but demand is not brisk.

Transportation from mines to tidewater is variable. In general coal comes through in about a week, but a considerable proportion gets sidetracked for longer periods. Car supply at the mines is ample for the comparatively small tonnage offered. In the coastwise vessel market, vessels are scarcer and in some demand. The Delaware and Chesapeake bays are opening, but business at Baltimore is temporarily disorganized by the fire. We quote current rates from Philadelphia as follows: Providence, New Bedford and Long Island sound, 75c.; Boston, Salem and Portland, 85c.; Portsmouth, 90c.

Birmingham. Feb. 8.

(*From Our Special Correspondent.*)

The Alabama coal market continues active. The shipments of coal from this State to New Orleans have not abated. Alabama shipped nearly 100,000 tons of coal monthly to that trade by rail and water in the past two months, the Pennsylvania shipments being cut off through frozen rivers. The local demand, that is in the regular marts supplied by this State, has been steady. The miners' wages remain unchanged. The minimum mining wage, 47½c. per ton, will continue through this month, at least.

State Mine Inspector Gray has not completed his compilation of figures on the output of the mines in this State for the year 1903. The mines actually heard from go over 11,190,000 tons and it is figured that 700,000 tons more will be accounted for. As to coke, there are but two companies yet to report, and the figures in hand show 2,382,224 tons of coke manufactured in Alabama in 1903, against 2,210,735 tons at all the ovens in Alabama in 1902. There are over 650 ovens to be accounted for yet, which permits an estimate that the entire production will reach more than 2,500,000 tons.

Chicago. Feb. 8.

(*From Our Special Correspondent.*)

In both anthracite and bituminous markets wholesale coal dealers find trade good as compared with conditions two or three weeks ago, but there is no boom. The effects of a severe winter are just beginning to be felt considerably in the coal business. Had there not been such heavy stocking up of dealers in anthracite early in the season and such general over-production of bituminous coal, Chicago territory would now be clamoring for all kinds of coal. But as it is, no one looks for really heavy trade in anthracite and there are no prospects of immediate bettering of the demand for bituminous unless it is brought about by possible labor troubles at the mines.

The demand for Indiana and Illinois is not strong, but prices are well maintained. The demand continues most active for low-priced grades. Run-of-mine continues $1.60@$2.10; screenings, $1.50@$1.75, and lump, $2@2.50. Hocking is in good demand at $3.25@$3.90 and there is no trouble with the supply. Smokeless holds up well to previous quotations—$3.65 for run-of-mine and $4.35 for prepared sizes, but the demand is light. Gas coals are again in demand and Youghiogheny and Pittsburg bring $3 @$3.25 per ton.

Cleveland. Feb. 9.

(*From Our Special Correspondent.*)

The market for coal in this territory has been a little easier during the past week. The steady demand both for domestic and for steam coal during the past few weeks and the slackening of the supply through the appearance of floods and snowstorms, caused the operators to make an especial effort to get the material started in this direction. This has resulted in something approaching an over-supply of all kinds of coal in this territory. The failure of the natural gas supply at several critical times has caused a desertion of that fuel for coal. This, with the continued cold weather, has kept up a steady demand for domestic coal. Prices have not changed, Massillon being held at $2.50 at the mines.

The market for steam coal cannot be said to be in that same robust condition. The demand for this coal has been somewhat lessened. Prices are steady, but weak. Pittsburg coal is worth about $1.25 at the mines and Ohio coal about $1.10.

The coke situation is easier. The movement has been more free and production has not been restricted. The prices have held firm but steady at $2.25@$2.50 for good 72-hour foundry coke, with furnace coke running about $1.50@$1.60 at the oven.

Pittsburg. Feb. 9.

(*From Our Special Correspondent.*)

Coal.—Trade is better this week and prices are firm. The failure to agree on a mining rate for the coming year at the conference of miners and operators who are parties to the Inter-State agreement has strengthened the market. While both sides seem to be far apart, it is confidently believed that a settlement will be reached before the expiration of the present scale on March 31. A special committee of operators and miners will meet on Monday and arrange for reconvening the general conference. The operators insist on the scale of 1902, and the miners ask for a renewal of the present scale. The reduction offered by the operators averages about 12%. The Monongahela River Coal & Coke Co. has about 15,000,000 bush. of coal ready for shipment south.

Connellsville Coke.—There is an unusual improvement in the coke market, and for the first time in several months there is complaint of a scarcity of railroad cars. The H. C. Frick Coke Co. is now operating about two-thirds of its ovens and has withdrawn from the foundry coke market. Its production is being taken by the plants of the United States Steel Corporation. Prices are firmer, and $1.50@$1.60 is quoted for furnace coke for early delivery and $2.10@$2.25 for foundry. On contract, from 5c. to 10c. more is asked. The *Courier* in its last report gives the production for the previous week at 196,708 tons. The shipments aggregated 8,311 cars, distributed as follows: To Pittsburg and river tipples, 3,350 cars; to points west of Pittsburg, 3,541 cars; to points east of Everson, 1,480 cars.

BY TELEGRAPH.

The Pittsburg Coal Co. held its annual meeting in Jersey City on February 10. The report shows net profits of $6,751,025 for the year ended December 31, 1903, or 87% greater than the average net profits during its previous existence of three years and four months.

San Francisco. Feb. 4.

(*From our Special Correspondent.*)

The market continues quiet, with no change in prices. Sales of fuel oil are on rather a liberal scale.

Pacific coast coals in large lots to dealers are quoted as follows: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky mountain coals, ex-car, to dealers, prices are $14 for Colorado anthracite, $11.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside. Eastern coal is still nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland, with very light stocks. Foreign coal in cargo lots is quoted at $13 for Welsh anthracite, $8.50 for cannel, $7.50 for Wallsend and Brymbo.

Foreign Coal Trade. Feb. 10.

The export trade continues quiet. A little better business with the West Indies is reported.

Imports of fuel into Belgium for the calendar year are reported as follows, in metric tons:

	1902.	1903.	Changes.
Coal	3,232,510	3,548,618	I. 316,108
Coke	824,256	841,272	I. 17,016
Briquettes	671,700	623,472	D. 48,228
Totals	4,728,466	5,013,362	I. 284,896

Imports of coal were chiefly from Germany, with some from Great Britain. The coke came from Germany and France.

Exports of coal from Cardiff, in Wales, during 1903, for the first time in the history of the port, exceeded 20,000,000 tons. The actual figure was 20,021,892 tons, but there were special reasons for the increased exports. They were due partly to the quantity shipped to America in the early months of the year in consequence of the United States coal strike, and partly to the quantities which had been sent towards the end of the year to the Far East.

Messrs. Hull, Blyth & Co., of London and Cardiff, report, under date of January 30, that, in the absence of any further demand from the Far East, there is no real change. Bests remain steady, while seconds are a shade easier. Quotations are: Best Welsh steam coal, $3.72; seconds, $3.54; thirds, $3.36; dry coals, $3.60; best Monmouthshire, $3.36; seconds, $3.30; best small steam coal, $2.04; seconds, $1.62; other sorts, $1.50. The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty.

Outward freights have a weaker tendency, doubtless owing to the gain of tonnage in Cardiff and the scarcity of February stems. Some rates quoted from Cardiff are: Marseilles, $1.25; Genoa, $1.38; Naples, $1.35; Singapore, $2.52; Las Palmas, $1.38; St. Vincent, $1.50; Rie de Janeiro, $2.04; Santos, $2.40; Buenos Aires, $1.68.

IRON TRADE REVIEW.

New York, Feb. 10.

The situation in the iron market is not altogether clear. While there has been some improvement in the demand for finished material, the pig iron situation is not good. There is some talk of contracts for the second quarter of the year, but buyers insist upon very low prices, even lower than those which have been recently ruling for early deliveries. At the same time, production is increasing, and in the Pittsburg district quite a number of furnaces have gone into blast since January 1. The United States Steel Corporation is not buying any iron outside of its own stacks. A further disquieting feature in the situation is the cutting reported in steel billets, which are said to have sold as low as $20, Pittsburg, which is $3 below the pool price. It is further rumored that some of these cut sales have been made by members of the pool.

In finished material there is a somewhat hopeful feeling in bars, as it is understood that car-builders will soon be in the market for considerable quantities. Structural material orders are also increasing a little. The steel rail deadlock still continues, and the rail mills are very short of orders. In some branches, however, as in pipes and tubes, a very fair business is reported.

Ore prices for the coming year are now under discussion. The large stocks on docks and furnaces will have quite an important bearing on the situation. There is so much ore on hand that, in all probability, shipments in the early part of the coming season will be very light.

There is some discussion over the effect of the Baltimore fire on the demand for structural material. Of course, there will be some call for steel, but it can hardly be immediate, as it will take some time to make arrangements for the new buildings, which will be ultimately required.

Birmingham. Feb. 8.

(*From Our Special Correspondent.*)

There are indications that Southern pig iron manufacturers are selling iron under the quoted prices, but inquiry fails to elicit the source of this cheaper iron. An investigation of iron salesbooks of the Tennessee Coal, Iron & Railroad Co. and the Sloss-Sheffield Steel & Iron Co. during the past week by the committees of the miners of the two concerns showed that the average price of the iron sold during the month of January, 1904, is under $9 per ton. This would indicate that No. 4 foundry and gray forge sold between $8.50 and $9 per ton, while No. 2 foundry could have sold at $9.75@$10 per ton. In establishing the average, all grades are considered except the two grays. A small lot of silver gray was sold in Birmingham during the past week at $11.25 per ton. The Sloss-Sheffield Co. reported 35,000 tons of iron sold, while the Tennessee Co. accounted for something over 23,000 tons. The Sloss-Sheffield Co. manufactured in round numbers 33,550 tons of iron last month, while the shipments were close to 40,000 tons.

A visit to manufacturers during the past week ascertained the fact that there was not a brisk demand for pig iron, but prices are holding firm, the quotations being based on $10 for No. 2 foundry.

The following quotations are announced: No. 1 foundry, $10@$10.50; No. 2 foundry, $10; No. 3 foundry, $9.50; No. 4 foundry, $9; gray forge, $8.75; No. 1 soft, $10.50; No. 2 soft, $10.

The Ensley steel plant is preparing to start up more fully than it has been running during the past week. Steel rails are now being made, but only two or three of the ten open-hearth furnaces are in operation. During this week three or four of the other furnaces will go on. The labor under the 15% cut in wages is quite restless. Employes in the open-hearth department are not satisfied with the piece scale recently established and have asked for a change.

The steel plant at Gadsden, belonging to the Alabama Steel & Wire Co., is nearing completion.

The conference between officials of the Tennessee Coal, Iron & Railroad Co., the Sloss-Sheffield Steel & Iron Co. and the Republic Iron & Steel Co., looking to a consolidation of the three companies, which was to have been held in Birmingham last week, had to be deferred until a later date, because of the illness of members of the family of Mr. A. W. Thompson, president of the Republic Co. It is likely that the conference will be held this week.

Chicago. Feb. 8.

(*From Our Special Correspondent.*)

There is no decided change in the pig-iron market. Unless all signs are misleading, however, the market is strengthening slowly. Southern is the chief iron demanded and sold, and is apparently holding well up to the $10 Birmingham price for No. 2, or $13.85 Chicago. Some of the largest lots sold may have brought 50c. less, but the $9.50 minimum on general business has gone. Northern is in steady, but light demand and brings $14 for No. 2—pratically the same as southern. Lake Superior charcoal has fallen $2, being now quoted at $15; the demand for it is extraordinarily light.

The depressed condition of iron-making in the Chicago district is forcibly shown in the number of furnaces closed. Only two of the ten furnaces in the district, making iron for general consumption, are in blast—Minerva furnace, at Milwaukee, and Mayville furnace, at Mayville, Wis. The two furnaces of the International Harvester Co., at South Chicago; the two of the Iroquois Iron Co., the two at Bay View, Wis.; the one at Spring Valley, Wis., and the Zenith furnace, at Duluth, are all out. Uncertainty regarding labor conditions adds to the depression of the furnace men.

Orders for iron are still for small lots, though there is not so much pressure for quick deliveries. Foundrymen are looking ahead three to six months, and ordering accordingly.

Coke is superabundant. There is too much of it on track and no signs of lessened shipments. Coke sells at $4.75 for 72-hour foundry.

Cleveland. Feb. 9.

(*From Our Special Correspondent.*)

Iron Ore.—The Ore Association held a meeting in this city during the past week and agreed to disagree as to prices. The producers of non-bessemer ore wanted a horizontal reduction of $1 a ton, to which the bessemer old-range producers would not agree. The former represent the class catering to the foundry iron trade, while the latter represents entirely their own trade, producing such ore as they need for their own purposes. The difference in the market is, of course, very natural. The situation is complicated by the demands of quite another class, which wants concessions on personal account. It is now time to fight out the questions which have been puzzling, and the result is that a complete disagreement as to prices has been reached. The likelihood is that the individual producers will make their own prices during the coming year. This hardly anticipates any war of prices, as the understanding is of an amicable nature. It was even decided that there shall be a curtailment of production during the coming year to about 60% of the output for the past year, making the total about 15,000,000 tons. This compares with 23,500,000 for 1903. The action is in anticipation of a lessening of the demand for the output and is getting the ore market ready to meet conditions which are expected to exist hereafter.

Pig Iron.—The buying of foundry iron is somewhat limited just now. The entire trade is in hand-to-mouth buying, little disposition being seen on either side to enter into any long contracts. The northern stacks have the market to themselves, finding little competition in the southern stacks, which have decided upon a stable list of prices, with $10 as the minimum, which takes them out of the northern market, where No. 2 foundry is being quoted at $12.50 @$13. There is very little if any market for bessemer or basic.

Finished Material.—The steadiest part of the market has been the bar iron trade. The demand which has come in from the agricultural implement works has indicated that those concerns expect a good business throughout the entire year. The demand for spot delivery has been fair, but the principal call has come from contracts for material for delivery extending to July 1. It is evident that some of the material now being purchased is that which was held over from the fall months. Prices have held steady at 1.30c., Pittsburg, for bessemer and 1.40c., Pittsburg, for open-hearth. The strength in bar iron is purely artificial, the slight advance being due to a determination on the part of the mill owners to put the prices up because the prices of scrap are so high. The market holds at 1.30@1.35c., Youngstown. The smaller mills which tried to get together on sheet prices did not succeed very well, some of the producers holding aloof. The effort, however, was beneficial to the trade, less business being taken at cut prices than has been the case heretofore. The quotations are almost representative at 2.5c. for No. 27 black sheets out of stock and 2.35c. for the same gauge in car lots at the mill. The structural trade has not improved very much. The price holds at 1.6c., Pittsburg.

Old Material.—The demand for scrap has not improved to any appreciable extent. The short supply and the slightly improved consumption have given the market a harder tone.

New York. Feb. 10.

Pig Iron.—The local market is quiet with prices unchanged. We quote as follows, for northern irons, good brands: No. 1 X foundry, $15.25@$15.50; No. 2 X, $14.75@$15; No. 2 plain can be had for 50c. less; while gray forge is selling around $13.75. For southern irons on dock quotations are: No. 1 foundry, $14.25; No. 2 foundry, $13.75, with lower grades in proportion. No. 1 soft can be had at about $14.25, and No. 2 soft at $13.75.

Bar Iron and Steel.—Buying shows no especial change. Refined bars are quoted at around 1.45c., in large lots, with steel at about the same. Common iron bars are as low as 1.30c.

Plates.—The market is still quiet. Sheared plates are quoted as follows: Tank, 1¼-in. and heavier, 1.76@1.80c.; flange, 1.95@2.05c.; marine, 2.10@2.15c.

Steel Rails.—The quotations remain $28 for standard sections, f. o. b. mills; light rails, $33 @$36, according to weight.

Structural Material.—Large lots at tidewater are still quoted at 1.75@2c. for beams, angles and channels.

Philadelphia. Feb. 10.

(*From Our Special Correspondent.*)

The interesting feature of the week is the anticipated placing of large orders for basic and foundry iron for the delivery during the second quarter of the year. Some few contracts were placed yesterday in this city, and it is understood from the representatives of the makers that other contracts, two or three of them of quite large dimensions, will quite probably be placed before Saturday. Makers of forge iron also claim that they are participating in this improvement, and some of them who are now winding up their November and December contracts expect to secure heavy orders. Scarcely anything has been done by consumers in this market with southern iron, although several arrangements are under way which will probably lead to some business. Quotations continue as last week, namely, $15.50 for No. 1 X foundry; $14.50 for No. 2; $14 for No. 2 plain; basic, $14; gray forge, $13.50@$14.

Billets.—There is something in the air to-day in regard to billets, and it is said that two or three large billet deals will probably go through this week. The purchases are from independent concerns, who are shading prices to get business, and they will probably get it. Quotations, $24@$24,50.

Merchant Bar.—A very hopeful feeling has suddenly manifested itself within the past few days, based on the anticipation of business from car-builders who have secured contracts for a good many cars. The actual business done within the past week does not show any improvement, and prices have not responded to the possibly premature anticipations of eastern bar iron makers.

Sheets.—A couple of good sized contracts have just been secured by eastern sheet makers, for which special inducements were offered. The general tone of the sheet iron market is very weak on the lower grades.

Pipes.—Pipe work holds out very well and agents are sending small orders to mill. One or two pipe mills made purchases of iron this week.

Tubes.—The consumption of tube work continues about the same and discounts are unchanged, though it is understood that for large orders inducements would be held out.

Merchant Steel.—The business for the week has been light; in fact, users have not been heard from. No changes in prices are known.

Plates.—Apart from some business placed by car-builders and shipyards the plate iron industry is without change.

Structural Material.—The only business done is in small and medium sized lots, in which small angles participated this week on a basis of 1.50. Beams, channels and angles are quoted as usual at 1.73½@1.85c.

Old Rails.—Holders are not disposed to part with their stock at the prices now ruling.

Scrap.—Scrap has sold better during the past week for the cheaper grades, but there is a continued scarcity of the kinds most wanted—choice railroad, country scrap and heavy steel scrap. An offer was made to-day for $12.50 by an urgent buyer for a good sized lot of heavy steel that would suit his purpose.

Pittsburg. Feb. 9.

(*From Our Special Correspondent.*)

While there is an improvement in finished lines of iron and steel, the pig iron market is still in bad shape and prices continue to decline. One large concern reports sales within the past week of about 10,000 tons of bessemer pig iron in lots of 500, 1,000 and one of 2,000 tons for delivery within 30 days at prices ranging from $12.75 to $13.25, Valley furnace. A still further decline in price is expected, and consumers are not buying more than a month ahead. The United States Steel Corporation is not buying any outside iron, and as a result there was a shortage at the Shoenberger plant of the American Steel & Wire Co. last week, and although it is crowded with orders it was forced to suspend operations. Fires were immediately started in the Neville Island and the Edith blast furnaces owned by the wire company, and both will be making iron before the end of the week. The Niles furnace of the Carnegie Steel Co. was put in blast on Sunday, and stack No. 3 of the Ohio group will be started about March 15. The new stack, No. 4, will be ready for blast about May 1. Additional merchant blast furnaces are being put in operation. On Sunday night the Alice furnace at Sharpsville went into blast, and stack No. 1 of the Shenango Furnace Co. and the Mabel furnace at that place will be started this week. J. G. Butler, Jr., chairman of the Bessemer Furnace Association, has given out the following official statement of the condition of the blast furnaces: "On February 1 there were 99 furnaces running with a daily capacity of 40,500 tons, and 67 furnaces out of blast. These furnaces are tributary to the Lake Superior ore region and include Johnstown, Steelton, Sparrows Point, Pittsburg and vicinity, Wheeling and vicinity, the Mahoning and Shenango valleys, southern Ohio and the Columbus and Cleveland districts. The idle capacity is 38 per cent. The idle capacity on January 1 was 69 per cent." The ore interests are to hold another meeting this week to consider prices for the season. A two days' session was held at Cleveland last week, but no result was reached. The price question is a difficult one, as the ore brought down last season is sufficient to supply the demand of the furnaces up to August 1 at least, and it must be paid for at last season's prices. It is understood that a reduction will be agreed upon.

The principal disturbing feature in the steel market is the cutting of billet prices. Members of the pool are reported to have shaded the agreed price, and it was stated to-day by the representative of a large interest that a sale of bessemer billets was made within the past few days at $20. Some new steel rail orders were placed during the week, and it is now believed the pool will ignore the requests for a reduction to $26 or $24 and continue the $28 rate throughout the year. It is reported that the Lackawanna Steel Co. has sold the New York Central 25,000 tons at the pool price. The United States Steel Corporation has received orders from western roads aggregating about 15,000 tons. Less than one-half of the capacity of the rail mills of the country for the year has been contracted for, and buying is evidently being delayed in the expectation of lower prices prevailing. Orders for finished material are increasing, and the outlook is much brighter than it has been at any time since the opening of the year and there seems to be a tendency toward higher prices. The demand is particularly good for merchant pipe, steel bars and wire products. During the week the National Tube Co. announced a general advance of from 2.5 to 3.5%, or about $2 a ton. The advance was followed by the independents. The independent sheet concerns are determined to get better prices and have withdrawn all previous quotations. This has stopped buying except for immediate requirements, but it is believed that firmer prices can be maintained. The American Sheet & Tin Plate Co. continues to operate nearly all of its tin-plate mills to their full capacity and is stocking the product. Large stocks are being accumulated, and it is reported that the company is preparing to force a reduction in wages when the present agreement with the Amalgamated Association of Iron, Steel & Tin Workers expires on June 30.

Pig Iron.—At least 10,000 tons of bessemer pig iron were sold during the past week at $12.75@$13, Valley furnaces, and it is believed prices will go lower. Both foundry and forge iron are weaker. Sales of foundry No. 2 are reported as low as $13.25, Pittsburg, and it is believed this rate could be shaded. Gray forge has sold as low as $12.75, Pittsburg, but a few small lots brought $13.

Steel.—It is reliably reported that bessemer steel billets have sold at $20, or $3 under the pool price, and that there is considerable cutting. The tonnage, however, was very small. All finished lines show a big improvement, and prices are more likely to advance than decline. Steel bars are held firmly at 1.30c. and plates at 1.60c.

Sheets.—Prices are firmer and a trifle higher than a week ago. The independents have withdrawn all low quotations, and the American Sheet & Tin Plate Co. also is naming better prices. Black sheets, No. 28 gauge, are quoted at 2.30c. and galvanized at 3.30@3.35c.

Ferro-manganese.—There is no change in the market, 80% domestic still being quoted at $44 @$45 per ton.

Cartagena, Spain. Jan. 23.

(*Special Report of Barrington & Holt.*)

Iron and Manganiferous Ores.—There is a slight improvement in demand, but little variation in prices. Sellers are generally asking higher terms. The seamen's strike continues to affect coasting trade mostly. Freights continue low, 6s. 6d. having been paid from Cartagena to Maryport. Shipments for the week were 3,750 tons dry ore and 1,750 tons of manganiferous, all to Great Britain.

Quotations for ordinary 50% ores continue 6s. 9d.@7s., with 6d. more for low phosphorus ores. Specular 58% ore is quoted at 9s. 3d.; magnetic ore, 60%, 11s. 6d. for lump and 9s. 6d. for smalls. Manganiferous ores range from 9s. 9d. for 12% manganese and 35% iron, up to 14s. 6d. for 20% manganese and 20% iron.

Pyrites.—Iron pyrites, 43% sulphur and 40% iron, are quoted at 10s. 6d. per ton.

Other Exports.—Other exports include 2,500 tons ocher to Bristol.

CHEMICALS AND MINERALS.

New York, Feb. 10.

The present inadequate transportation facilities by delaying regular contract deliveries, presage an unwelcome activity in the early spring, when the trade is usually busy.

An unusually large export order for high-grade phosphate rock has been placed with the agent of a Florida mining company by Mr. S. Raunheim, of New York, who represents important European consumers. The order calls for 100,000 tons per annum during the 10 years to 1914, and the price is understood to be a little more than is now quoted on future deliveries.

Apropos the annual report of the General Chemical Co., just issued, it is interesting to note that the net earnings of $1,278,702 in 1903 are the smallest reported since 1900, yet stockholders have received in dividends $970,515, equivalent to nearly 80 per cent of the net earnings, which compares with 56 per cent in 1901, and is the largest distribution since the organization of the company in 1899. Up to December, 1903, the preferred stockholders have received $2,575,178, or 24 per cent, and the holders of common stock, $1,300,537, or 17 per cent in dividends.

The German Kali Syndicate announced on February 6 that this season's prices for potassium salts will be unchanged from last year.

Through a similarity in names it was inadvertently stated last week that the Franklin H. Kalbfleisch Chemical Co. was part of the General Chemical Co. There is no connection bebetween them, nor is the Martin Kalbfleisch Chemical Co., a valuable asset of the General Chemical Co., affiliated with the defunct firm of Martin Kalbfleisch & Sons, whose debts, contracted mostly in 1886, have necessitated Mr. Franklin H. Kalbfleisch to make a personal assignment recently.

Cyanide. — The market continues quiet, at 19.5@20c. per lb., f. o. b. New York.

Bleaching Powder. — Sales ex-dock are reported at $1@$1.05 per 100 lb., to relieve stocks that are likely to accumulate when delayed steamers arrive. Contract prices remain at $1.25 for prime British and American, and $1.20 for Continental. Lower grades can be had at a discount.

Copper Sulphate.—Apparently importers are determined to increase their business in this market by underselling domestic makers. Recent sales have been on a basis of $5.05@$5.10 per 100 lb.

Acids.—Consumption is seasonably good, and prices continue firm.

We quote as below per 100 lb., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°	$1.50	Oxalic, com'l	$5.00@$5.25
Muriatic, 20°	1.60	Sulphuric, 50°, bulk, ton	13.50@14.50
Muriatic, 22°	1.75	Sulphuric, 60°	1.05
Nitric, 36°	4.50	bulk, ton	18.00@20.00
Nitric, 38°	4.75	Sulphuric, 66°	1.20
Nitric, 40°	5.00	bulk, ton	21.00@23 00
Nitric, 42°	5.50		

Brimstone.—Limited supplies on spot have initiated firm prices of $22.75@$23 per ton for best unmixed seconds, while shipments are quoted at $22.25@$22.50. Thirds are nominally 50c. less than seconds. A report is current that the extensive sulphur deposits on Mt. Makuskin, Unalaska island, owned by the Philadelphia Crude Ore Co., Dr. Alexander De Soto and Major Habecker, of Philadelphia, are to be actively developed this spring. It is said that there are about 500,000 tons of sulphur, 75% pure, "in sight." Consumers of Japanese sulphur on the Pacific coast, taking annually from 15,000 to 20,000 tons, are somewhat alarmed over the hostilities in the Far East, which will interfere with importations. To import Sicilian brimstone at San Francisco by sailing vessel, via Antwerp, Belgium, will be rather costly, as the ocean freight is about 28s. ($6.72). This should be an opportune moment to push the sale of pyrites, as the consumption of sulphuric acid in the manufacture of explosives has greatly increased.

Pyrites.—A cargo of 1,915 tons Pilleys island iron pyrites has arrived at New York and one of 4,500 tons Spanish copper pyrites at Philadelphia.

We quote domestic pyrites $5 per ton for lump ore, f. o. b. Atlantic coast mines, and 10c. per unit for fines; sulphur content varies from 42@44%. Spanish pyrites, carrying from 46@52% sulphur, are quoted at 11@11.5c. per unit for lump, and 9.5@10c. for fines, delivered at Atlantic ports.

Nitrate of Soda.—Some inconvenience has resulted from the long delay in arrival of two large cargoes. Consequently spot is firm at $2.15 per 100 lb., and futures, $2.025@$2.10, according to position.

Messrs. Mortimer & Wisner's statement of nitrate of soda, dated New York, Feb. 1, gives the following interesting statistics, in tons:

	1904.	1903.
Imported into Atlantic ports from West Coast, S. A., from Jan. 1, 1904, to date, Tons	27,706	18,293
	27,706	18,293
Stock in store and afloat, Feb. 1, 1904, in New York	1,900	165
Boston	700	....
Philadelphia	125	....
Baltimore	2,300	1,243
Norfolk, Va.	....	2,524
Charleston	2,800	2,853
Wilmington, N. C.	3,400	....
To arrive, due May 15, 1904	64,950	76,500
Visible supply to May 15, 1904	76,175	83,285
Stock on hand, Jan. 1, 1904	8,100	7,800
Deliveries past month	24,581	19,308
Total yearly deliveries	....	229,589
Prices current, Feb. 1	2.17½c.	1.97½c.

Sulphate of Ammonia.—Business only moderate. Good gas liquor is quoted $3.175@$3.20 per 100 lb. In 1903 exports from Great Britain to the United States were 8,398 tons, being the smallest quantity since 1899. The exports to all countries were 162,217 tons, second best period on record, while production amounted to about 234,000 tons, being the largest yet reported. Stocks in Great Britain on December 31, 1903, are estimated at 12,000 tons, the same as a year previous.

Saltpeter.—Consumption at Atlantic points in January is given as 4,001 bags, being better than a year ago. Deducting this from the month's arrivals of 5,289 bags and the 496 bags held January 1, makes the stocks February 1, 1,784 bags, or 219 bags larger than last year. There is on way from India 8,173 bags, making the apparent supply on February 1, 9,957 bags, or 3,730 bags less than 1903. Crude is worth $3.50 per 100 lb., and refined $4.25 up.

Phosphates.—In Florida there are 48 hard rock and 8 land pebble plants at work, which, owing to last year's heavy shipments, are not burdened with very large stocks. Exports of hard rock are paying the reduced railroad rate of 1c. per long ton mile, in effect January 15, to inland points. Heretofore this rate varied, and it is claimed favored shippers to Savannah, Ga., where facilities for export are better than at Fernandina, Fla. Last year the exports of Florida rock through Savannah were 156,483 tons, which compares with 108,629 tons from Fernandina, notwithstanding the longer distance from mines to the first named port. There are advocates of a new shipping port on Crystal river, where cargoes may be sent to the same loading basin now used by the Port Inglis Terminal Co. A favorable feature is that the Camp Lumber Co., affiliated with the Camp Phosphate Co., who, with J. Buttgenbach & Co., are said to be considering the scheme, has an independent railroad from Dunnelton to Crystal river. An important factor, however, is the deepening of the channel for seagoing vessels, which, it is hoped, will be done by the government. When it is considered that phosphate mining is one of the chief industries in Florida, and that the export trade in hard rock represents several millions of dollars, an improvement in shipping facilities is worthy of prompt consideration.

Export orders are not numerous just now, hence the contract for 1,000,000 tons, referred to elsewhere is of unusual interest.

Exports of Florida rock from Savannah in January were 3,636 tons, about half the quantity reported a year ago, and considerably less than the months in the last quarter of 1903.

The Green Bay phosphate plant, near Bartow, Fla., destroyed by fire January 24, it is said, will be rebuilt. Boston people erected the plant on valuable phosphate land about 18 months ago.

Foreign phosphates are in a strong position; inasmuch as Ocean Isle mines are not offering for this year, Christmas Isle is well contracted for and only small lots are put on the market, while Algerian and Tunis are not looking for more business at present.

Current ocean freight rates are about as follows:

	Shipping-ports. Florida.	So. Carolina.	Algeria.
Baltic	$3.24@$3.36	$2.26	....
Continental	2.76@ 3.00	....	2.16
Mediterranean	3.36@ 3.60	....	....
United Kingdom	2.64@3.12	2.40 @2.64	1.56@ 1.68

Prices for phosphates per ton are as follows:

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
*Fla. hard rock, 77@80%	$6.50@7.00	$10.27@$11.06
land pebble, 68@73%	3.75@ 4.00	7.35@ 8.05
†Tenn, 78@82%	4.00@ 4.25	10.00@ 10.80
78%	3.75@ 4.00	.....
75%	3.25@ 3.50	.....
73@74%	2.95@ 3.20	.....
‡So. Car. land rock	3.25	.....
river rock, 55@60%.	2.75@ 3.00	5.75@ 6.88
Algerian 63@70%	.....	6.98@ 7.65
58@63%	.....	6.20@ 6.66
53@58%	.....	4.95@ 5.09
Tunis (Gafsa)	.....	6.05@ 6.65
Christmas Isle, 80@85%	.....	11.96@ 12.54
Ocean Isle, 82@88%	.....	12.33@ 13.18
Somme, Fr., 70@75%	.....	10.15@ 10.33
Bordeaux, Fr., 60@65%	.....	7.50@ 7.66
55@60%	.....	6.33@ 6.47
Liege, Bel., 60@65%	.....	6.78@ 7.11

* F. o. b. Florida or Georgia ports. † F. o. b. Mt. Pleasant. ‡On vessel, Ashley River, S. C.

Liverpool. Jan. 27.

(*Special Report of Joseph P. Brunner & Co.*)

Trade generally is rather quiet, and while there is an American inquiry for sulphate of copper, the actual business in this article is limited and quotations are a shade easier at £21 2s. 6d. per ton, f. o. b. Liverpool, for prompt delivery, usual terms, with 2s. 6d.@5s. premiums asked for February and spring delivery. Soda ash is very steady. For tierces nearest range for any position is about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@ £6 per ton net cash. Ammonia ash, 48%, £4 5s. @£4 10s.; 58%, £4 10s.@£4 15s. net cash; bags 5s. per ton under price for tierces. Soda crystals are in fair request at generally £3 7s. 6d. per ton for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda is still quiet, but prices are firm, as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters. Bleaching powder is dull, at nominally £4 5s.@£4 10s. per ton, net cash, for hardwood packages, as to market. Chlorate of potash is slow, at nominally 2⅜@ 2½d. per lb. for English make. Bicarb soda is selling at £6 15s. per ton, less 2½% for the finest quality in 1 cwt. kegs, with usual allowances for larger packages.

METAL MARKET.

New York, Feb. 10.

Gold and Silver Exports and Imports,

At all United States Ports in December and Year.

Metal	December. 1902.	December. 1903.	Year. 1902.	Year. 1903.
Gold: Exports.	$2,853,112	$1,464,656	$36,030,591	$44,346,834
Imports.	2,186,636	17,230,298	44,193,317	65,267,696
Excess	E. $666,476	I. $15,765,642	I. $8,162,726	I. $20,920,862
Silver: Exports.	5,546,875	5,079,244	49,272,954	39,189,933
Imports.	2,701,296	2,078,655	26,402,935	23,974,508
Excess	E. $2,845,589	E. $3,000,589	E. $22,870,019	E. $15,224,425

These exports and imports cover the totals from all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending February 6 and for years from January 1

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.
Week	$324,000	$44,188	$593,455	$35,233
1904	809,162	1,194,272	4,991,974	103,637
1903	26,303	623,172	1,764,379	118,304
1902	6,236,390	29,236	4,703,316	119,787

The figures for the current year include shipments too late for last week's summary.

General business is quiet. The great fire losses at Baltimore will have some unfavorable effect, since such a calamity cannot fail to react upon the community generally.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending February 6 gives the following totals, comparison being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts	$924,958,600	$998,850,800
Deposits	940,180,100	1,027,156,500
Circulation	44,175,700	41,509,400
Specie	178,014,800	205,966,900
Legal tenders	75,575,900	72,665,000
Total reserve	$253,590,700	$278,631,900
Legal requirements	235,045,025	256,789,125
Balance surplus	$18,545,675	$21,842,775

Changes for the week this year were increases of $4,298,700 in loans and discounts, $3,212,700 in deposits, and $489,400 in specie; decreases of $1,229,600 in circulation, $2,972,500 in legal tenders, and $3,286,275 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison is made with the holdings at the corresponding date last year:

	1903. Gold.	1903. Silver.	1904. Gold.	1904. Silver.
N. Y. Ass'd	173,322,015	.....	168,033,500	.....
England	173,322,015	.....	168,033,500	.....
France	502,760,105	$218,930,570	468,953,520	$221,258,645
Germany	168,535,000	59,215,000	168,850,000	59,325,000
Spain	72,045,000	99,435,000	72,930,000	98,725,000
Netherlands	23,488,500	33,254,500	10,196,000	32,780,500
Belgium	15,800,000	7,900,000	15,723,335	7,861,665
Italy	84,505,000	10,858,500	110,425,000	18,619,500
Russia	383,480,000	35,980,000	430,250,000	36,565,000
Austria	231,095,000	63,335,000	232,950,000	98,725,000

The returns of the Associated Banks of New York are of date of February 6, and the others February 4, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market has improved owing to a sentimental impression that the Russian-Japanese war will stimulate the price. Indian buyers have raised their figures and the tendency at present is toward higher prices.

The United States Assay Officer in New York reports receipts of 71,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to January 28 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904.	Changes.
India	£832,800	£1,367,489	I. £534,689
China	81,500	.....	D. 81,500
Straits	50,782	38,103	D. 12,679
Total	£965,082	£1,405,592	I. £ 440,510

Receipts for the week were £245,000 in bar silver and £3,000 in Mexican dollars from New York; £6,000 in bar silver from China, and £50,000 in Mexican dollars from the straits; total, £304,000. Shipments were £264,000 in bar silver and £34,200 in Mexican dollars to Bombay, and £5,000 in bar silver to Madras; total, £303,200.

Indian exchange continues very strong, owing to the heavy shipments from that country, and to the demand for money there. The council bills offered in London sold this week at an average of 16.13d. per rupee. Purchasers of silver for private account in India continue very fair. There is also more gold going from Australia to India.

Shipments of gold from Australia for the full year are reported as follows, in sterling:

	1902.	1903.	Changes.
Melbourne	£3,444,104	£4,631,081	I. £1,186,977
Sydney	2,905,104	4,438,212	I. 1,533,108
Adelaide	.....	103,750	I. 103,750
Fremantle	6,391,685	7,421,843	I. 1,030,157
Total	£12,740,893	£16,594,886	I. £3,853,993

Of the exports in 1903, the sum of £8,829,721 went to India; £288,018 to Hongkong; £1,600,000 to South Africa; £1,500,000 to San Francisco; £29,619 to New York; the balance going to Great Britain.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$0.43½	$0.46
Peruvian soles and Chinese pesos	.41	.44
Victoria sovereigns	4.85⅓	4.87
Twenty francs	3.85	3.87
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

February.	Silver—N. Y. Cts.	Silver—London, Pence.	Copper—Lake, Cts. per lb.	Copper—Electrolytic, Cts. per lb.	Copper—London, £ per ton.	Tin, Cts. per lb.	Lead, Cts. per lb.	Spelter—N. Y., Cts. per lb.	Spelter—St. Louis, Cts. per lb.
4	55½	25 1/16	12 @12⅛	11⅞ @12	55¾	28	4.35 @4 40	4.85	4.65
5	55½	25¾	12 @12⅛	11⅞ @12	56	28	4.35 @4.40	4.85	4.65
	55⅛	25 1/16	12 @12⅛	11⅞ @12	....	28	4.35 @4.40	4.85	4.65
8	56⅛	25 15/16	12 @12⅛	11⅞ @12	55½	27⅞	4.35 @4.40	4.87½	4.67½
9	56¼	26¼	12 @12⅛	11⅞ @12	55¼	27¾ 27⅝	4.35 @4.40	4.87½	4.67½
10	56¼	26¼	12 @12⅛	11⅞ @12	55½	27¾	4.35 @4 40	4.87½ @4.90	4.70

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars: the price of electrolytic cathodes is usually 0.25c. lower than these figures

QUOTATIONS ON STERLING EXCHANGE.

February 4	4.85⅛	February 8	4.85⅛
" 5	4.85⅛	" 9	4.85⅛
" 6	4.85⅛	" 10	4.85⅝

Copper.—The weak condition of the stock exchanges, caused by the outbreak of hostilities between Russia and Japan, exercised a somewhat disturbing influence on the market. However, as predicted in our last week's report, at the lower values established a good business has developed. Fair orders have been placed by home consumers, and we understand some business has also been transacted for export. The closing quotations are given as 12@12⅛c. for Lake copper; 11⅞@12c. for electrolytic in ingots, cakes and wirebars; 11⅝@11¾c. in cathodes; 11⅝@11¾ for casting copper.

The market for standard copper in London, which closed last week at £56, opened on Monday at £55 10s., and the closing quotations on Wednesday are cabled as £55 10s.@£55 12s. 6d. for spot, £55 7s. 6d.@£55 10s. for three months.

Refined and manufactured sorts we quote: English tough, £60@£60 10s.; best selected, £61@£61 10s.; strong sheets, £70@£70 10s.; India sheets, £67@£67 10s.; yellow metal, 6¼d. @6⅜d.

Exports of copper from New York and Philadelphia this week were 3,052 tons, principally to Great Britain and Holland. Imports were 423 tons from Mexico.

Tin.—The market last week ruled steady at about 28c., but during the last few days values have given way and the closing quotations are 27⅝@28¾ for spot and futures.

The foreign market, which closed last week at £125 5s., opened on Monday at £125 10s., declined on Tuesday to £124 12s. 6d., and the closing quotations on Wednesday are cabled as £124 12s. 6d.@£124 15s. for spot, £125@£125 2s. 6d. for three months.

It is thought in some quarters that the Chinese speculators who bought very largely some time ago, are liquidating their holdings. However, it has proved impossible to get this report confirmed.

Lead has ruled quiet but firm throughout the week, without any special feature. The ruling quotations are 4.35@4.40c. New York, 4.30@4.32½c. St. Louis.

Spanish Lead Market.—Messrs. Barrington & Holt report from Carthagena, Spain, under date of January 23, that silver has sold at 14.75 reales per oz. Exchange is 34.41 pesetas to £1. Local quotation for pig lead is 65.75 reales per quintal, which, on current exchange, is equal to £10 14s. per long ton. Exports for the week were 101,000 kg. desilverized and 393,383 kg. pig lead to Marseilles, 1,008,000 kg. desilverized and 1,227,136 kg. pig lead to London.

Spelter.—There has been a fair demand for both galvanizing and brass purposes, which resulted in somewhat higher quotations. The market closes at 4.70c. St. Louis, 4.87½@4.90c. New York.

The foreign market remains strong, good ordinaries being quoted at £21 17s. 6d.@£22, specials £22 2s. 6d.@£22 3s. 9d.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt, report from Cartagena, Spain, under date of January 23, that business continues brisk, and large sales are being made at the mines at advanced prices. One mine recently sold out a stock of 60,000 quintals. Exports for the week were 200 tons calamine and 3,190 tons blende to Antwerp.

Antimony has ruled firm throughout the week. On account of the war between Russia and Japan, strong efforts are being made to raise prices, but so far consumers have remained very apathetic indeed. The closing quotations are given as 7½@7¾c. for Cookson's; 6⅝@6⅞c. for Hallett's; 5⅞@6c. for U. S., Japanese, Italian, French, Hungarian and Chinese.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Platinum.—Demand continues steady, and the price is easier at $18.50 per oz.

Messrs. Eimer & Amend, of New York, quote prices for platinum in manufactured forms, as follows: Heavy sheet and rod, 72c. per gram; foil and wire, 75c. per gram; platinum crucibles and dishes, 77c. per gram; perforated wire, like cones, Gooch crucibles, etc., 82c. per gram.

Quicksilver.—The New York price is $45.50 per flask for large lots, while a slightly higher figure is quoted for smaller orders. The San Francisco quotations continue at $44@$45 per flask for domestic orders and about $41.50 for export. The London price is £8 5s. per flask, with the same quotation asked by second hands.

Cadmium.—According to Herr Paul Speier metallic cadmium was in good demand throughout 1903. Metal containing 99.5 per cent. cadmium sold at from 675 to 700 marks per 100 kg., delivered in Berlin.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Aluminum	Per lb		Per lb
No. 1, 99% ingots	33@37c.	Ferro-Tungsten (37%)	38c.
No. 2, 90% ingots	31@34c.	Magnesium, pure (N. Y.)	60c.
Rolled Sheets	4c. up	Manganese	$2.75
Alum-bronze	20@23c.	Mangan'e Cop. (20% Mn)	32c.
Nickel-alum	34@39c.	Mangan'e Cop. (30% Mn)	38c.
Bismuth	$2.10	Molybdenum (Best)	$2.00
Chromium, pure (N. Y.)	80c.	Phosphorus, foreign	45c.
Copper, red oxide	50c.	Phosphorus, American	70c.
Ferro-Molybde'm (50%)	$1.25	Sodium metal	50c.
Ferro-Titanium (10%)	90c.	Tungsten (Best)	88c.
Ferro-Titanium (20@25% N. Y.	55c.		

Variations in price depend chiefly on size of order. Advances in molybdenum and tungsten have been made recently.

Missouri Ore Market. Feb. 6.

(*From Our Special Correspondent.*)

The highest price paid for zinc ore delivered during the week was $38 per ton, and this was paid for at least three bins of ore, against only one bin bringing this price the previous week. The assay price ranges from $34 per ton of 60% zinc, for the best grades, down to $32 per ton for less desirable grades. The enforced restriction of output during the last week of January caused by a severe cold wave, reduced the reserve stock about 1,100 tons. This, with another buyer in the field, caused an active demand for the ore in the bins. Lead went off $1 per ton, closing the week at $56.50. The shipments for the week were as follows:

	Zinc, lb.	Lead, lb.	Value
Joplin	3,003,560	421,070	$82,370
Webb City-Carterville	2,668,890	306,000	49,935
Duenweg	1,031,740	290,410	25,670
Galena-Empire	1,036,540	144,180	20,140
Badger	563,940	9,100	10,700
Aurora	652,210	3,810	9,530
Prosperity	300,610	129,920	7,550
Alba-Neck	353,790	....	6,365
Granby	415,000	60,000	6,100
Spurgeon	181,640	128,470	5,680
Oronogo	199,860	29,150	3,935
Carl Junction	171,020	....	3,080
Zincite	124,090	....	1,985
Reeds	101,260	....	1,720
Carthage	95,410	....	1,430
Cave Springs	61,590	7,260	1,220
Central City	50,560	13.940	1,125
Totals	11,911,710	1,543,310	$238,535
Six weeks	55,868,220	7,349,230	$1,104,035

Zinc value: the week, $195,655; six weeks, $903,255.
Lead value: the week, 42,880; six weeks, 200,780.

The shipments aggregated 5,956 tons of zinc, an increase of 1,700 tons, and the lead shipment was 772 tons, a little more than double the shipment of 380 tons the previous week.

Average Prices of Metals per lb., New York.

Mo.	Tin. 1903	Tin. 1904.	Lead. 1903.	Lead. 1904.	Spelter. 1903.	Spelter. 1904.
Jan...	28.33	28.845	4.075	4.347	4.865	4.863
Feb ..	29.43	....	4.075	.....	5.043	....
Mar..	30.15	.....	4.442	.....	5.349	....
April.	29.81	.....	4.567	.....	5.550	....
May .	29.51	.....	4.325	.....	5.639	....
June .	28.34	.....	4.210	.....	5.607	....
July..	27.68	.....	4.075	.....	5.662	....
Aug..	28.29	.....	4.075	.....	5.725	....
Sept..	26.77	....	4.243	.....	5.686	....
Oct...	25.92	.....	4.375	.....	5.510	....
Nov..	25.42	.....	4.218	.....	5.638	....
Dec...	27.41	.....	4.162	.....	4.731	....
Year	28.09	.....	4.237	.....	5.400	....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673½ per lb.

Average Prices of Copper.

Mo.	New York. Electrolytic. 1903.	New York. Electrolytic. 1904.	New York. Lake. 1903.	New York. Lake. 1904.	London. Standard. 1903.	London. Standard. 1904.
Jan...	12.159	12.410	12.361	12.553	53.52	57.55
Feb...	12.778	.....	12.901	.....	57.34	.....
Mar..	14.416	.....	14.572	.....	63 85	.....
April.	14.454	.....	14.642	.....	61.72	.....
May..	14.435	.....	14.618	.....	61.73	.....
June .	13.942	.....	14.212	.....	57.30	.....
July..	13.094	.....	13.341	.....	56.64	.....
Aug..	12.902	.....	13.159	.....	58.44	.....
Sept..	13.205	.....	13.345	.....	56.82	.....
Oct...	12.801	.....	12.954	.....	55 60	.....
Nov..	12.617	.....	12.813	.....	56.30	.....
Dec..	11.952	.....	12,084	.....	56.36	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars: prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902. London, Pence.	1902. N. Y., Cents.	1903. London Pence.	1903. N. Y., Cents.	1904. London, Pence.	1904. N. Y., Cents.
Jan. .	25.62	55.56	21.98	45.57	26 423	57.055
Feb. .	25.41	55.09	22.11	47.89	.....	.....
Mar..	25.00	54.23	22.49	48.72	.....	.....
April.	24.34	52.72	23.38	50.56	.....	.....
May..	23.71	51.31	24.89	54.11	.....	.....
June .	24.17	52.36	24.29	52.86	.....	.....
July..	24.38	52.88	24.86	53.92	.....	.....
Aug..	24.23	52.52	25.63	55.36	.....	.....
Sept..	23.88	51.52	26.75	58.00	.....	.....
Oct...	23.40	50.57	27.89	60.36	.....	.....
Nov..	22.70	49.07	27.01	58.11	.....	.....
Dec...	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.45	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Company.	Latest Dividend. Payable.	Rate.	Total.	Total to date.
American Coal	Mar. 1	1.25	$62,500	$1,495,000
*Bunker Hill & Sull	Feb. 5	...	33,000	1,583,000
*Daly-West, Utah	Feb. 15	.65	117,000	3,831,000
*Homestake, S. D.	Feb. 25	.25	54,600	12,476,950
*Kendall, Mont.	Feb. 20	.05	25,000	380,000
*Mines Co. of Am.	Feb. 20	.01¼	25,000	505,000
*S. Raf., aviador Mex.	Feb. 20	13.32	15,984	.....
*San Rafael, aviada	Feb. 20	7.04	8,448	.....
*Silver King, Utah	Feb. 10	.66⅔	100,000	7,550,000
*Soledad, Mex	Feb. 20	4.40	4,224	273,141
*Sorpressa, Mex	Feb. 20	2.20	2,112	204,290

* Monthly. † Quarterly. ‡ Semi-annually.

ASSESSMENTS.

Company.	Delinquent.	Sale.	Amount.
Caledonia, Nev.	Mar. 2	Mar. 21	.15
Challenge Con., Nev.	Feb. 24	Mar. 16	.10
Champion, Cal.	Feb. 20	.....	.25
Eureka Con. Drift, Cal.	Feb. 13	.....	.00½
Godiva, Utah	Feb. 29	.....	1.00
Marina Marsicano, Cal.	Feb. 29	Mar. 21	.05
Milford, Utah	Mar. 4	Mar. 25	.00½
Orient, Cal.	Feb. 15	.....	.35
Red Slide, Cal.	Mar. 5	.....	.05
Rodesino, Cal.	Mar. 3	.....	.03
Silver Shield, Utah	Mar. 3	Mar. 19	.03
Tule Belle, Cal.	Feb. 27	.....	.01

STOCK QUOTATIONS

NEW YORK.

Company.	Par val.	Feb. 3 H.	Feb. 3 L.	Feb. 4 H.	Feb. 4 L.	Feb. 5 H.	Feb. 5 L.	Feb. 6 H.	Feb. 6 L.	Feb. 8 H.	Feb. 8 L.	Feb. 9 H.	Feb. 9 L.	Sales.
Acacia												08⅛		1,500
Amalgamated, c.	100	49⅜	48⅛	48¼	48	48¾	48⅛	48	45¼	45¼	43⅜	45⅞	43⅜	244,629
Anaconda, c.	25	69⅛	69⅛	68½	....	68	65	65	65	66	64¼	66	....	3,300
Anaconda, g.	7	....	....	....	....	....	....	....	....	....	....	....	....	....
Belcher, s.	3	37	36	....	....	....	....	....	....	....	....	....	....	600
Best & Belcher, s.	25	....	....	....	....	....	....	1.95	....	....	....	....	....	300
Brunswick, g.	5	.06	....	06	05½	06	....	06	....	....	....	....	....	6,900
Bullion, s.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Caledonia, s.	1	1.05	....	....	....	1.00	....	....	....	....	....	....	....	210
Challenge, s.		....	....	....	....	....	....	....	....	22	....	....	....	200
Chollar, s., g.	2½	....	....	22	21	....	....	....	....	....	....	....	....	470
Confidence	3	....	....	....	....	....	....	....	....	....	....	....	....	....
Con.Cal.&Va., g.s.	2½	1.65	1.60	1.70	....	....	....	1.55	....	1.60	....	1.65	....	1,150
Con. Imperial, s.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Creede & C. Ck., g.	1	....	....	....	....	03	....	....	....	....	....	....	....	1,000
Cripple Creek, g.	1	....	....	08	....	....	....	....	....	....	....	....	....	1,000
Crown Point	2½	30	....	....	....	26	....	....	....	....	....	27	26	1,400
Daly, g. s.	20	....	....	....	....	....	....	....	....	....	....	....	....	....
Elkton, g.	1	56	....	57	....	52	....	....	....	60	....	....	....	1,300
El Paso, g.	1	....	....	05	....	....	....	02	....	....	....	....	....	1,500
Gold Dollar, g.		....	....	06	....	06½	06	06	....	....	....	....	....	3,500
Gould & Curry	1	....	....	....	....	....	....	....	....	28	....	....	....	300
Greene Con., c.	10	11⅜	10⅝	11⅛	11	11⅛	10⅝	11⅜	10½	11	10½	10	10⅝	19,400
Hale & Norcross	3	....	....	....	....	68	....	....	....	....	....	76	75	800
Homestake, g.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Horn Silver	20	....	....	1.25	....	....	....	....	....	....	....	....	....	200
Isabella, g.	1	....	....	20	....	21	20	20	19	....	....	18	....	2,800
Jack Pot, g.	1	....	....	....	....	....	....	....	....	10	....	....	....	400
Julia, s.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Justice, s.	2	11	....	....	....	....	....	....	....	....	....	....	....	300
Leadville, s. l	10	....	....	....	....	....	....	....	....	....	....	....	....	....
Little Chief, g. s.	50	....	....	....	....	....	....	....	....	09	....	....	....	30
Mexican, s.	3	....	....	1.55	....	....	....	1.50	....	1.60	1.50	1.60	....	800
Mollie Gibson, g.	5	....	....	....	....	....	....	....	....	07½	07	07½	....	2,000
Occidental, s.	3	....	....	75	....	....	....	....	....	....	....	....	....	200
Ontario, s. l.	100	4.50	....	....	....	4.50	....	....	....	....	....	4.50	....	205
Ophir, s.	3	4.00	....	3.60	....	3.50	....	....	....	04	....	....	....	800
Overman, s.	2	....	....	....	....	....	....	....	....	....	....	....	....	....
Pharmacist, g.	1	04	....	10	04½	....	....	05	....	....	....	....	....	3,100
Phœnix, g.	1	10	....	10	....	10	....	11	10	11	....	....	....	5,600
Portland, g.	1	1.85	....	1.80	....	....	....	....	....	....	....	....	....	600
Potosi, s.	1	23	....	20	....	20	....	....	....	19	....	22	18	1,800
Quicksilver, Pf.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Savage, s.	3	45	....	....	....	45	....	....	....	45	43	....	....	850
Sierra Nevada, s.	3	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Hill, g. s.	1	74	....	75	....	....	....	....	....	75	....	....	....	400
StandardCon., g.s.	10	....	....	2.50	....	....	....	....	....	....	....	....	....	100
Tenn., c.	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Union Con., g. s.	1	....	....	81	80	....	....	75	....	....	....	....	....	500
Union Copper	25	¾	....	¾	1-16	¾	....	¾	....	....	....	....	....	1,700
United, com., c.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Utah, s.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
White Knob, c.	10	....	....	7	7	7	6½	....	....	....	....	7½	....	825
Work	1	08½	....	08½	....	....	....	....	....	....	....	....	....	2,000
Yellow Jacket, s.	3	....	....	....	....	47	....	....	....	....	....	53	....	300
C. K. & N.		....	....	....	....	....	....	....	....	....	....	18	....	500

c—Copper. g—Gold. l—Lead. s—Silver. Total sales, 315,669 shares. † Ex-dividend.

BOSTON, MASS.

Company.	Par val	Feb. 3 H.	Feb. 3 L.	Feb. 4 H.	Feb. 4 L.	Feb. 5 H.	Feb. 5 L.	Feb. 6 H.	Feb. 6 L.	Feb. 8 H.	Feb. 8 L.	Feb. 9 H.	Feb. 9 L.	Sales.
AdventureCon., c	$25	....	....	2½	....	2⅜	2¼	2 7/16	2¼	2¼	....	2¼	....	1,315
Aetna q.	5	....	....	....	....	....	....	....	....	....	....	....	....	....
Allouez, c.	25	4⅝	4½	4½	4¼	....	....	4¼	4⅜	4¼	4⅛	....	....	840
Amalgamated, c.	100	49⅜	48½	49⅛	48	48¾	46¼	46	45¼	45⅝	43	45½	43⅛	33,706
Am. Gold Dredg.	5	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Z., L. & Sm.	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Anaconda, c. s.	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Arcadian, c.	25	45	35	50	45	50	45	....	....	....	....	....	....	1,195
Arnold, c.	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Atlantic, c.	25	....	....	....	....	....	....	7¾	....	8	....	7½	....	125
Bingham Con.	50	21¾	....	21½	....	21½	21	....	....	21¼	20½	21	20½	1,195
Bonanza Dev. g.	10	40	....	40	....	....	....	....	....	....	....	....	....	350
British Col., c.	5	....	....	....	....	....	....	....	....	....	....	....	....	....
Calumet & Hecla	25	450	445	440	....	445	....	....	....	440	435	440	448	82
Centennial, c.	25	16	15½	15⅞	15¼	15½	15	....	....	15	14⅜	15½	14⅜	2,007
Central Oil.	25	7¼	....	....	....	....	....	7⅛	....	....	....	7½	7¼	250
Con. Mercur, g.	5	60	....	....	....	....	....	58	55	57½	....	65	....	1,895
Copper Range	100	44	43⅜	43¼	43	43½	42¾	43	42	42	39	40¾	39¼	6,684
Daly West, g. s. l	20	35	34⅜	35½	35	35½	....	35½	....	†35	34¼	34½	34¼	1,242
†Dominion Coal.	100	61	60	60	59	60	58½	59⅜	59¼	60	59	59⅛	58½	1,070
Preferred	100	....	....	....	....	....	....	108	107½	110	109	108	....	137
Dominion I. & S.	100	....	....	....	....	....	....	9	....	8¼	....	....	....	35
Elm River, c.	12	....	....	....	....	2	....	2	....	2	....	2	....	165
Franklin, c.	25	....	....	....	....	....	....	8¼	8	8⅛	....	8¾	8½	324
Granby Con.	10	3½	....	....	....	3⅜	....	3½	....	3⅜	3⅛	3⅛	....	2,025
Guanajuato Con.	5	85	80	....	....	....	....	....	....	1.00	80	80	....	1,460
Isle Royal Con.	25	....	....	....	....	....	....	....	....	....	....	7¼	....	45
Mass Con., c.	25	....	....	....	....	4¼	4	....	....	....	....	....	....	30
Mayflower, c.	25	....	....	....	....	....	....	....	....	75	....	....	....	10
Michigan, c.	25	....	....	....	....	....	....	5½	....	....	....	....	....	5
Mohawk, c.	25	36	....	36½	36¼	36	35¾	35½	35⅝	35½	34⅛	34½	....	1,396
Mont. Coal & C.	25	....	....	....	....	3	....	....	....	....	....	....	....	300
Mont'l & Boston.	5	....	....	62½	....	....	....	....	....	....	....	62½	....	400
New Idria, q.	5	....	....	....	....	....	....	....	....	10	....	....	....	13
Nova Scotia St.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Preferred	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Old Colony, c.	25	....	....	....	....	....	....	....	....	....	....	1¼	....	30
Old Dominion, c.	25	10	....	....	....	10	....	....	....	....	....	10	9¼	240
Osceola, c.	25	59	58½	57	56	58½	....	56¼	55½	56	53	56	....	1,357
Parrot, s. c.	10	25½	24¼	24½	24	24½	24	24	23¼	23½	21	23	21¾	2,137
Phœnix Con, c.	25	....	....	....	....	2½	....	2½	....	....	....	2½	....	370
Quincy, c.	25	87½	85	87½	....	....	....	....	....	....	....	90	....	85
Rhode Island, c.	25	....	....	1	....	1	....	....	....	....	....	....	....	275
Santa Fe, g. c.	10	....	....	2	....	1⅝	....	1⅝	....	....	....	1⅞	1⅝	275
Shannon, c.	10	8	....	8¼	8⅛	8	....	8	7⅞	7¾	7½	....	....	1,380
Tamarack, c.	25	105	....	....	....	....	....	....	....	100	....	....	....	78
Tecumseh, c.	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Tennessee, c.	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Trinity, c.	25	5	4¾	5	4¾	....	....	4¾	4⅝	4¾	....	4⅞	4¾	1,485
United c.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
United States, g.	10	20⅝	20⅛	20½	....	20⅝	20¼	20¼	....	20¼	19⅝	20½	19¾	7,247
U. S. Coal & Oil.	25	9⅛	....	9⅛	9	....	....	9	....	8⅞	8⅝	8⅞	8⅝	995
Utah Con., g. c.	5	33¾	32¾	33¼	32¾	32¾	32	32¼	31⅞	32	30⅛	32	30¾	9,450
Victoria, c.	25	....	....	3½	3¼	3¼	....	3⅜	3¼	3⅜	3	....	....	510
Winona, c.	25	6¼	....	6½	6	6¼	6	6	5⅞	6	....	5½	5¼	462
Wolverine, c.	25	72	....	....	....	....	....	72	71	72	71	70	....	189
Wyandot, c.	25	1	....	....	....	....	....	....	....	....	....	....	....	20

†Ex-dividend. ‡Assessment Paid. Total sales, 81,866 shares.
c—Copper g—Gold. l—Lead. q—Quicksilver. s—Silver.

Duluth, Minn. Jan. 30.

Company	Par Val.	Bid.	Asked.	Company	Par Val.	Bid.	Asked.
Calumet & Arizona	$10	$110	$111	Lake Sup. & Pitts.	$10	$130	$135
Calumet & Bisbee	10	7.50	8.00	Pitts. & Duluth	10	50.00	51.00
Calumet & Cochise	10	7.50	8.00	Shakespeare			.20
Calumet & Pittsburg	10	33.50	35.00	United Mexican			.50
Higgins Dev.	10	3.00		Wolv. & Arizona	10	4.00	
Junction Dev.	10	14.00	14.50	Yaqui	10		1.50

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	Feb. 3 H.	Feb. 3 L.	Feb. 4 H.	Feb. 4 L.	Feb. 5 H.	Feb. 5 L.	Feb. 6 H.	Feb. 6 L.	Feb. 8 H.	Feb. 8 L.	Feb. 9 H.	Feb. 9 L.	Sales
Allis-Chalmers	$100	9	8.⅛	9½	9	9⅛	9	9⅛	9¼	9½	....	....	....	4,200
Preferred	100	....	....	60	....	....	....	....	....	....	....	....	....	400
Am. Agr. Chem	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Preferred	100	....	....	....	....	....	....	....	....	....	....	75¼	....	13
Am. Sm. & Ref.	100	50	49⅛	49½	49	48¾	48	48	....	47¾	47	48¼	47⅜	9,950
Preferred	100	92⅜	91¼	91½	....	91¾	91½	91¼	....	91	90	90½	90½	3,405
Col. Fuel & I.	100	31½	31	32⅛	30⅞	30¾	30½	31½	....	31	30½	31⅞	30⅜	3,900
Preferred	10	....	....	65	....	65	....	....	....	....	....	....	....	215
Col. & H. C. & I.	100	14¾	14¼	14	13½	14¼	13¼	13½	13¼	14¼	13⅛	....	....	3,230
†Crucible Steel	100	3¾	3⅜	....	....	3⅞	....	....	....	3⅞	....	3¾	....	190
*Preferred	100	26½	....	27	26⅛	26⅜	....	26⅜	....	26¼	....	26¼	....	740
General Chem.	100	....	....	55	....	....	....	....	....	....	....	....	....	....
Preferred	100	....	....	....	....	....	....	....	....	....	....	....	....	....
*Mong. R. Coal	50	....	....	....	....	....	....	....	....	8	....	....	....	25
*Preferred	100	....	....	....	....	....	....	25	....	....	....	....	....	10
National Lead	100	15¼	....	15	....	....	....	....	....	....	....	14¾	14⅝	15	14¾	900
Preferred	100	81¼	....	....	....	....	....	....	....	....	....	....	....	....	....	10
*Phila. Nat. Gas.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
*Preferred	100	45	....	....	....	....	....	....	....	....	....	....	....	....	....	25
*Pittsburg Coal	100	....	....	13¼	13	....	....	13	12⅜	12½	12¼	12¼	....	2,480
*Preferred	100	48½	48	48	47	47¾	47½	47⅛	46½	48	45	48¾	45	2,518
Republic I. & S.	100	7¼	....	7⅛	....	7¼	....	7⅛	....	7⅜	....	7	7⅛	1,450
Preferred	100	45	44½	44¼	....	43½	....	43½	....	43¼	....	44½	44	2,070
Sloss-Shef S. & I.	100	37	....	....	....	38¼	....	37	....	37	36	38	....	930
Preferred	100	....	....	....	....	....	....	....	....	79¼	....	....	....	100
Standard Oil	100	....	....	650	....	....	....	650	....	....	....	640	....	12
Tenn. C.I. & R.R.	100	37¼	36¼	37½	36	37	35½	35¾	34¾	36	34½	37	36	15,665
U.S. Red. & Ref.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Preferred	100	....	....	....	....	....	....	....	....	....	....	....	....	....
U.S.Steel Corp.	100	10¾	10½	11¼	10⅝	11⅛	10⅜	11⅛	10¾	11⅛	10¾	11¾	10⅞	55,348
Preferred	100	55½	54⅜	56	54⅜	55½	54⅞	56⅛	54¾	56⅛	55	58⅛	55½	281,495
Va.-Car Chem.	100	33	32½	32½	31½	31½	29¼	29¼	29¼	28½	28	29	28	9,625
Preferred	100	106	....	....	....	....	....	....	....	....	....	160	....	200

*Pittsburg exchanges. Total sales, 399,106.

COLORADO SPRINGS, COLO.

Company.	Par Val	Jan. 30 H.	Jan. 30 L.	Feb. 1 H.	Feb. 1 L.	Feb. 2 H.	Feb. 2 L.	Feb. 3 H.	Feb. 3 L.	Feb. 4 H.	Feb. 4 L.	Feb. 5 H.	Feb. 5 L.	Sales
Acacia	$1	.08	.07½	08	.07⅜	.08	.07¾	.08	.07⅞	.08	.07⅝	.08	.07	3,000
American Con	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Anaconda	5	.18	.16	.18	.15	17¼	.14	.17	....	.17	.15	15¾	.15	4,000
Colo. City & M.	1	.03	.02½	.02⅞	.02⅜	.03	.02¾	.03	.02¾	.03⅛	.03	.03⅛	.03	20,000
C. K. & N.	1	.18	.15	.20	.18	19⅛	....	19	.16	.18⅜	.16	.18⅜	.16	1,000
Cripple Ck. Con.	1	.07¼	.07	.08¼	.08	.08	.07¾	.08	.07½	.08	.07⅝	.07¾	.07¼	16,000
Des Moines	1	.02	....	.02⅜	.01⅞	.02¼	.02	.02¼	.02	.02¼	.01⅞	.02¼	.01¾	....
Doctor Jack Pot.	1	.07¾	.07	.08	.07	.07¾	....	.08	....	.09	.08⅛	.08⅜	....	5,500
Elkton Con.	1	.56½	....	.60	.57½	.61	.59	.61	.60	.60½	.60⅛	.60	.59½	27,800
El Paso	1	.61½	.61	.62½	.61¼	.62	.61¾	.62½	.62	.62¾	.62	.62	.61½	13,111
Gold Dollar Con.	1	.04½	.04¼	.05	.04⅞	.05⅛	.05⅛	.05⅜	.05⅛	.05⅜	.05½	.05⅝	.05⅜	15,475
Gold Sovereign.	1	.04½	.04¼	.04½	.04¼	.04½	.04⅜	.04⅝	.04¼	.04½	.04¼	.04⅝	.04⅝	11,000
Golden Cycle	1	.60	.57	.57	....	.58	.55½	.58½	.55	.58	....	....	....	500
Golden Fleece	1	.06	....	.04½	....	.04½	....	....	....	.04	....	.04	....	....
Hart	1	.03½	.02¾	.04	.02⅛	.04	.02⅛	.03½	.03	.03⅛	.03	.03⅜	.02⅝	1,000
Isabella	1	.11½	....	.17⅛	.13½	.22	.20	.20	.19½	.19½	.18	.17	.16	25,050
Jack Pot	1	.07	.06	.07	.06½	.08	.07	.08¼	.07½	.08¼	.07½	.08	.07½	....
Keystone	1	.04⅜	.4¼	.04¾	.04½	.04¾	.04⅝	.04⅝	....	.04¾	.04¼	.04½	.04	7,000
Last Dollar	1	.50	....	.70	....	.50	....	.50	....	.50	....	.50	....	....
Lexington	1	.04¾	.04½	.05	.04⅞	.05¼	.04⅞	.05½	.05	.05	.04¾	.05	.04½	6,000
Little Puck	1	.02½	.02¼	.02¾	.02½	.02¾	.02¼	.02¾	.02½	.02⅝	.02½	.02¾	.02⅝	21,000
Mollie Gibson	1	.05¾	....	.05¼	....	.05	....	.05	....	.10	.05½	.05¼	....	....
Moon-Anchor	5	.10	.09½	.10½	.09¾	.10½	.09¾	.12	.10	.12	.10½	.12	.10¼	4,700
New Haven	5	.03¼	.03	.03½	.03⅛	.03⅜	.03¼	.03⅜	.03⅛	.03⅝	.03⅜	.03¼	.03⅛	8,000
Old Gold	1	.09¼	.08¾	.08¾	....	.08¾	.08⅜	.10	.08¾	.09½	.08⅝	.08⅞	.08¾	20,000
Pharmacist	1	.04	.03½	.04⅜	.04	.04½	.04¼	.04½	.04⅜	.05	.04¼	.04½	.04⅛	10,000
Pinnacle	1	.04	.03¼	.05	.04⅛	.05	.04¼	.05	.04⅛	.05	.04⅝	.04½	.04	9,000
Portland	1	1.80	1.50	2.00	1.50	2.00	1.72	2.00	1.50	1.94	1.75	1.95	1.50	400
Vindicator Con.	1	.60¼	....	.85	.60	.60	....	.85	.62	.85	.60¼	.85	.60½	....
Work	1	.07¼	.07	.07¾	.07⅜	.07¾	.07⅜	.07¾	.07¼	.07½	.07⅜	.07¾	.07½	20,500
	1	....	....	....	....	....	....	....	....	....	....	....	....	....

Total sales, 250,036 shares.

COLORADO SPRINGS (By Telegraph).

Company.	Feb. 8. H.	Feb. 8. L.	Feb. 9. H.	Feb. 9. L.	Company.	Feb. 8. H.	Feb. 8. L.	Feb. 9. H.	Feb. 9. L.
Anaconda	.16½	.12½	.16½	.12½	Jack Pot	.08½	.08	.08	.06
Cripple Ck Con.	.07¾	.07½	.08	.07½	Last Dollar	.45	.38	.45	.38
C. K. & N.	.18½	.17	.18	.17½	Mollie Gibson	.10	.05¼	.10	.05½
Doctor-Jack Pot.	.10	.08½	.10	.08½	Moon Anchor	.12	.10¼	.12	.10¼
Elkton Con	.60	.59½	60	.59½	Old Gold	.09¼	.08½	.08⅝	.08½
El Paso	.62½	.62	.62½	.62	Pharmacist	.04¼	.04⅛	.4½	.04¼
Gold Dollar Con.	.05½	.05¾	.05½	.05⅝	Portland	1.95	1.75	1.95	1.85
Gold Sovereign	.04⅜	.04½	.04¼	.04	Vindicator	.65	.61	.75	.62
Isabella	.18	.15½	.18½	.17½	Work	.07¾	.07½	.07½	.07⅝

SAN FRANCISCO.

Company.	Location.	Jan. 28 H.	Jan. 28 L.	Jan. 29 H.	Jan. 29 L.	Jan. 30 H.	Jan. 30 L.	Feb. 1 H.	Feb. 1 L.	Feb. 2 H.	Feb. 2 L.	Feb. 3 H.	Feb. 3 L.	Sales
Central Eureka	Cal	....	....	....	....	....	....	.81	....	....	....	....	....	100
Golden Anchor	Nev.	.17	....	....	....	....	....	....	....	....	....	....	....	200
Golconda	Ore.	....	....	....	....	....	....	....	....	....	....	....	....	....
Hannapah	Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
MacNamara	Nev.	.13	.12	....	....	....	....	....	....	.15	.12	.13	....	8,550
Mont. Tonopah	Nev.	1.42½	1.35	1.42	....	1.45	1.40	1.50	1.37½	....	....	1.42½	1.37½	4,407
South Eureka	Cal	....	....	....	....	....	....	....	....	....	....	....	....	....
Ton. Belmont	Nev.	.70	....	.74	.73	.76	.73	.75	.73	....	....	....	....	2,200
Ton. Midway	Cal	.46	.44	.43	.41	.40	....	.41	.40	.40	....	.41	....	7,500
Ton. Mg. Co	Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
Ton. North Star	Nev.	.35	....	.35	....	.35	....	.38	.35	....	....	....	....	1,900
Ton. & Salt Lake	Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
Ton. Superior	Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....

San Francisco and Tonopah Mining Exchange.
Total sales, 24,857 shares.

SAN FRANCISCO (By Telegraph).

Company.	February 8.	February 9.	Name of Company.	February 8.	February 9.
Belcher	.34	.30	Gould & Curry	.42	.40
Best & Belcher	1.75	1.75	Hale & Norcross	.75	.70
Caledonia	1.25	.98	Mexican	1.55	1.45
Challenge Con	.24	.21	Ophir	3.75	3.70
Chollar	.20	.18	Overman	.33	.31
Confidence	1.05	1.05	Sierra Nevada	.58	.56
Con. California & Virginia	1.60	1.50	Union Con	.79	.76
Crown Point	.28	.24	Yellow Jacket	.52	.52

STOCK QUOTATIONS

MEXICO.* Jan. 29

Company.	Shares Issued.	Prices. Bid.	Ask.
Durango:			
Ca. Min. de Penoles	2,500	$3,800	$4,100
San Andres de la Sierra	200	10,000	.....
Guanajuato:			
Angustias, Pozos	2,400	45	50
Cinco Senores y An., aviadoras	2,000	70	75
Cinco Senores y An., aviada	400	73	75
Providencia, SanJuan de la Luz	6,000	60	70
Queensland y Australia	300	72	100
Guerrero:			
Delfina, 1st serie	2,500	52	60
Delfina, 2nd serie	2,500	37	45
Garduno y Anexas	7,200	35	45
Hidalgo:			
Amistad y Condordia	9,000	81	82
Carmen, aviada	1,100	120	150
Guadalupe Fresnillo Mill	1,000	160	250
Guadalupe Fresnillo Mine	1,400	70	80
La Blanca, aviadora	1,536	.....	.....
La Blanca, aviada	768	.....	.....
La Reina y An., aviadora	5,000	14	16
Luz de Maravillas, aviadas	1,100	.....	20
Maravillas y An., aviador	1,080	120	140
Maravillas el Lobo	1,000	130	180
Palma y An., aviador	1,800	14	20
Real del Monte	2,554	.....	.....
Refugio, aviada	12,800	5	7
Santa Anay An., aviadora	1,800	85	100
Santa Anay An., aviada	600	30	40
Sta. Gertrudis y An., aviadas	9,600	13	15
Sta. Gertrudis y An., aviadora	28,800	81	82½
Santo Tomas Apostol aviadoras	5,100	2	3
San Felipe de Jesus, aviadora	3,000	17½	18½
San Felipe de Jesus, aviada	1,200	6	10
San Rafael y An., Trompillo	1,200	1,670	1,700
San Rafael y An., aviada	1,200	680	700
Soledad, aviada	960	680	700
Sorpresa, aviada	960	305	315
.....	.....	.....	.....

Name of Company.	Shares Issued.	Prices. Bid.	Ask.
Mexico:			
Alacran	2,400	25	30
Aldebarren	2,000	25	30
Buen Despacho	3,000	30	32
Dos Estrellas	3,000	1,850	2,000
La Esperanza (El Oro.)	3,000	1,500	1,500
La Reformia, aviadores	2,000	23	28
Providencia, pagadoras	1,800	.....	.....
Providencia, liberadas	900	.....	.....
Santa Ana, Esperanza	2,400	90	.....
Michoacan:			
Luz de Borda, aviadora	3,000	60	75
Luz de Borda, aviado	1,000	25	30
Santiago y An., Tlal.	4,000	2	17
Nuevo Leon:			
La Fraternal	1,000	580	620
Norias de Bajan	1,000	880	920
San Luis Potosi:			
Concepcion y An.	3,000	80	85
El Barreno, aviadora	2,000	52	55
Sta. Maria de la Paz	2,400	175	180
San Diegoy Annexas	2,400	8	10
Zacatecas:			
Asturiana y An.	2,500	50	58
Candelaria y Pinos	2,500	130	140
Cubiertas	2,400	.....	.....
Esperanza y An.	2,400	6	8
Lourdes	2,500	22	30
Luz de Minillas, pagadoras	2,000	15	30
Nueva Quebradilla, aviadoras	2,400	95	105
Nueva Quebradilla, aviadas	600	70	80
San Carlos y Annexas	2,500	90	100
Sta. Maria de Gaud	2,500	64	70
Miscellaneous:			
Bartolome de Medina	2,000	78	80
Guadalupe Hacienda	20,000	.....	.....
La Luz Hac. (Pachuca.)	3,750	.....	.....
La Reina (Chihuahua.)	192	.....	.....
Naica (Chihuahua.)	100	11,000	13,000
Natividad (Oaxaca) aviadora	1,800	1,000	1,050
Natividad (Oaxaca) aviadas	600	.....	.....
San Francisco Hac.	6,000	62	69
Santa Ana Huantla Morelos	4,000	.....	.....
Union Hacienda	3,000	215	230

*Values are in Mexican currency.

TORONTO, ONT. Feb. 6

Company.	Par val	Prices. High.	Low.	Sales
Black Tail, g	$1	.04	.02	.....
Cariboo-McKin	1	.06	.03	.....
Cariboo Hydr	1	.70	.....	.....
Center Star, g. s	1	.23	.21½	.....
Crows Nest, C.C	100	2.60	2.00	.....
Dominion Coal	100	.62	.59	.....
Dominion S. & I.	100	.09	.08	.....
Fairview, g. s	1	.04	.02½	.....
Giant, g. s	1	.....	.....	.....
Deer Trail, g. s	1	.02	.01	.....
Iron Mask, g. s	1	.09	.05	.....
Morrison, g. s	1	.04	.....	.....
.....	.....	.....	.....	.....

Company.	Par val	Prices. High.	Low.	Sales
Granby Smelter	$10	4.25	3.75	.....
Mountain Lion, g.	1	.18	12	.....
North Star, g. s.	1	.08	.07	.....
Nova Scotia Steel.	100	.....	.....	.....
Payne, s. l.	1	.16	.12	.....
Rambler Carib	1	.35	.25	.....
Republic, g.	1	.03	.....	.....
St. Eugene, g. s.	1	.40	.30	.....
Virtue, g. s.	1	.07	.06	.....
War Eagle Con.	1	.16	.09	.....
Sullivan, g. s.	1	.06	.03	.....
Winnipeg, g. s.	1	.04	.....	.....
Wonderful, g. s.	1	.04	.03	.....

g—Gold. l—Lead. s—Silver. Total sales, none.

SALT LAKE CITY.* Feb. 6

Company	Par Val	High	Low	Sales.
Ajax	10	.07	.06½	1,700
Butler Liberal	....	.10½	.10½	1,000
Carisa	1	.10⅜	.10	700
Century	1	.83	.82	1,000
Con. Mercur	1	.58¼	.55	4,700
Daly	5	2.17½	2.17½	100
Daly-Judge	1	4.10	3.60	850
Daly West	20	35.00	34.90	238
Dalton	....	.00½	00½	1,000
Egl. & Blue Bell	....	.50	.50	400
Ingot	½	.01¾	.01¼	11,000
Joe Bowers	....	.00⅝	.00¾	37,000
La Reine	....	.04	.03½	700
L. Mammoth	1	.44½	.39	7,040

Name of Company	Par Val	High	Low	Sales.
May Day	¼	.07¼	.06¾	14,400
M. Washington	½	.01⅞	.01⅛	68,500
Naildriver	....	.55	.55	200
N. Y. Bonanza	....	.20	.18½	18,800
Petro	....	.06	.04½	2,600
Sacramento	5	.20½	.19½	10,000
Star Con	1	.20½	.19	6,850
Tetro	1	.30	.32	4,000
Utah	....	.45	.45	700
Uncle Sam Con.	1	.25	.25	1,700
Victor Con	....	.05	.05	2,500
Wabash	1	.05¼	.05¼	5,000
Yankee Con	1	.45	.42½	500

*By our Special Correspondent. All mines are in Utah. Total sales, 209,178 shares.

PHILADELPHIA, PA

Company.	Par val.	Feb. 3 H.	L.	Feb. 4 H.	L.	Feb. 5 H.	L.	Feb. 6 H.	L.	Feb. 8 H.	L.	Feb. 9 H.	L.	Sales
Am. Cement	$10	.....	.....	7⅛	7¼	.....	.....	.....	.....	7⅛	....	7⅛	....	520
Cambria Iron	50	.....	.....	.....	.....	.....	.....	.....	.....	46⅝	46	46¼	....	157
Cambria Steel	50	19⅝	19⅛	19⅜	16	18⅛	18¼	19	.....	19	18¾	19⅝	19	3,215
Pa. Steel, pfd	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Susq. I. & S.	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
United Gas I.	50	86¾	85¾	85¾	85⅝	85½	85	85¼	.....	85	83¾	85⅞	84¼	2,030
Lehigh Nav'n	50	65⅛	.....	.....	.....	65	.....	65	.....	.....	.....	.....	.....	300
Philadelphia	50	41⅜	41	41¼	41	41¼	40⅛	40¾	40¼	40⅜	38¾	40½	39	3,877
U.S. Steel	100	10⅝	.....	1:1⅛	10½	11	.....	11	.....	11	10⅝	1:1⅜	11	5,805
U.S. Steel. pf.	100	55	54½	56	55	55⅞	54⅞	56⅛	54⅞	56¼	55⅛	58⅜	56	17,380

†Ex-Dividend Total sales 33,078.

LONDON. Jan. 29

Company.	Shares Issued.	Par value.	Latest dividend. Amt.	Date.	Quotations. Buyers.	Sellers.
American:		£. s. d.	s. d.		£ s. d.	£ s. d.
Alaska-Treadwell	200,000	5 0 0	1 6	Jan., 1904	4 10 0	4 15 0
Anaconda	1,200,000	5 0 0	2 0	Nov., 1903	3 12 6	3 17 6
Camp Bird	820,000	1 0 0	9	Feb., 1904	1 5 0	1 7 6
Copiapo	112,500	2 0 0	6 10	May, 1903	1 0 0	1 5 0
De Lamar	80,000	1 0 0	2 0	Oct., 1903	10 0	12 6
El Oro	1,080,000	1 0 0	9	Jan., 1904	1 5 0	1 7 6
Frontino & Bolivia	128,682	1 0 0	3 0	July, 1901	6 3	8 9
Le Roi	200,000	5 0 0	5 0	Nov., 1899	15 0	17 6
Le Roi No. 2	120,000	5 0 0	5 0	May, 1902	16 3	18 9
Montana	657,128	1 0 0	6	April 1899	1 6	2 0
Standard	500,000	4 0	2½	Sept., 1903	3 0	4 0
Stratton Independence	1,000,007	1 0 0	6	Dec., 1903	4 6	5 0
St. John del Rey	546,265	1 0 0	6	Dec., 1903	14 6	15 6
Tomboy	300,000	1 0 0	1 0	June, 1902	1 10 0	1 15 0
*Utah	300,000	1 0 0	6 3	Jan., 1904	6 7 6	6 12 6
Ymir	200,000	1 0 0	1 0	Mar., 1902	3 9	6 3
European:						
Linares	15,000	3 0 0	1 0	Mar., 1903	2 10 0	3 0 0
Mason & Barry	185,172	1 0 0	11 0	May, 1903	3 12 6	3 17 6
Rio Tinto	325,000	5 0 0	32 6	Nov., 1903	49 2 6	49 7 6
Rio Tinto, preferred	325,000	5 0 0	2 6	Nov., 1903	6 0 0	6 5 0
Tharsis	625,000	2 0 0	6 0	May, 1903	4 7 6	4 12 6
West Australian:						
*Associated	495,388	1 0 0	2 0	Jan., 1904	2 18 9	3 0 0
Cosmopolitan	400,000	1 0 0	1 0	May, 1903	15 6	16 0
Golden Horseshoe	300,000	5 0 0	6 0	Nov., 1903	8 18 3	8 18 9
Great Boulder	1,750,000	2 0	9	Dec., 1903	1 7 6	1 8 0
Great Fingall	250,000	1 0 0	6 0	Jan., 1904	8 5 0	8 7 6
*Ivanhoe	200,000	5 0 0	5 0	Jan., 1904	8 18 9	9 1 3
Kalgurli	120,000	1 0 0	2 6	Jan., 1904	5 16 3	5 18 9
Lake View	250,000	1 0 0	rts.	Aug., 1902	1 7 6	1 8 9
Oroya-Brownhill	450,000	1 0 0	2 6	Dec., 1903	3 16 3	3 18 9
Miscellaneous:						
*Brilliant Central	100,000	1 0 0	1 0	Feb., 1904	2 17 6	3 2 6
Briseis	600,000	1 0 0	.. ..	.....	6 0 0	6 6
Broken Hill	960,000	8 0	1 0	Aug., 1903	1 8 6	1 9 6
Mt. Lyell	275,000	3 0 0	4 3	Sept., 1903	17 0	18 0
Mt. Morgan	1,000,000	1 0 0	3	Feb., 1904	2 2 6	2 7 6
Waihi	497,412	1 0 0	2 6	Dec., 1903	4 18 9	5 1 3
Indian:						
Champion Reef	513,832	10 0	6 6	Jan., 1904	7 8 9	7 11 3
Mysore	566,043	10 0	4 4	Jan., 1904	6 13 9	6 16 3
Nundydroog	484,000	10 0	1 6	Nov., 1903	2 3 9	2 6 3
Ooregum	343,000	10 0	9	Dec., 1903	1 2 6	1 5 0
Ooregum, pfd	240,000	10 0	1 9	Dec., 1903	1 10 0	1 12 6
South African:						
Angelo	600,000	1 0 0	4 0	Jan., 1904	6 5 0	6 10 0
Bonanza	200,000	1 0 0	10 0	Feb., 1904	6 6 3	6 8 9
British South Africa	4,436,019	1 0 0	rts.	May, 1889	2 2 6	2 3 9
Cape Copper	300,000	2 0 0	4 0	Jan., 1904	2 16 3	2 18 9
Cape Copper, pfd	75,000	2 0 0	1 9	Jan., 1904	3 0 0	3 5 0
City & Suburban	340,000	4 0 0	8 0	Feb., 1904	6 7 6	6 12 6
Consol. Gold-Fields	2,000,000	1 0 0	.. ..	.....	6 1 3	6 3 9
Crown Reef	120,000	1 0 0	20 0	Oct., 1903	17 0 0	17 10 0
De Beers	800,000	2 10 0	10 0	Jan., 1904	18 5 0	19 7 6
De Beers, deferred	1,000,000	2 10 0	15 0	Jan., 1904	20 0 0	20 2 6
East Rand	930,000	1 0 0	5 0	Aug., 1903	6 11 3	6 12 6
Ferreira	90,000	1 0 0	22 6	Feb., 1904	20 0 0	20 10 0
Geldenhuis	200,000	1 0 0	6 0	Feb., 1904	5 15 0	6 0 0
Geduld	400,000	1 0 0	rts.	Mar., 1902	6 2 6	6 5 0
Henry Nourse	125,000	1 0 0	10 0	Feb., 1904	8 12 6	8 17 6
Jubilee	50,000	1 0 0	5 0	Feb., 1904	4 10 0	4 15 0
Jumpers	100,000	1 0 0	5 0	Aug., 1899	2 17 6	3 2 6
Langlaagte	470,000	1 0 0	2 0	Feb., 1904	3 8 9	3 11 3
May	288,750	1 0 0	3 6	Feb., 1904	4 0 0	4 2 6
Meyer & Charlton	100,000	1 0 0	5 0	Jan., 1904	5 12 6	5 17 6
Modderfontein	290,000	1 0 0	rts.	Apr., 1902	8 5 0	8 15 0
Namaqua	94,331	2 0 0	3 0	Dec., 1903	2 17 6	3 2 6
New Jagersfontein	200,000	5 0 0	10 0	Dec., 1903	28 2 6	28 7 6
New Primrose	325,000	1 0 0	3 0	Jan., 1904	3 15 0	3 17 6
Rand	1,795,956	5 0	4 0	Aug., 1902	9 7 6	9 8 9
Robinson	750,000	5 0 0	5 6	Feb., 1904	9 7 6	9 12 6
*Robinson Deep	950,000	1 0 0	3 0	Jan., 1904	5 3 9	5 6 3
Rose Deep	425,000	1 0 0	2 6	Feb., 1904	7 12 6	7 17 6
Salisbury	100,000	1 0 0	2 0	Mar., 1899	1 10 0	1 15 0
Sheba	1,075,000	1 0 0	6	July, 1899	10 0	12 6
Village	400,000	1 0 0	3 0	Feb., 1904	7 2 6	7 5 0
Wemmer	80,000	1 0 0	10 0	Jan., 1904	10 5 0	10 15 0

*Ex-dividend.

LONDON (By Cable.)*

Company.	Feb. 3 £. s. d.	Feb. 10 £. s. d.
Anaconda	3 12 6	3 0 0
British So. Africa	2 1 3	1 18 9
Camp Bird	1 6 6	1 4 0
Con. Gold Fields	6 5 0	5 13 9
De Beers	20 2 6	19 10 0
East Rand	6 11 3	6 0 0

Company.	Feb. 3 £. s. d.	Feb. 10 £. s. d.
El Oro	1 3 9	1 2 6
Modderfontein	8 4 4½	8 1 10½
Rand Mines	9 6 3	8 16 3
Rio Tinto	48 2 6	47 5 0
Simmer & Jack	1 8 9	1 6 3
Tomboy	1 11 3	1 7 6

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Jan 28

Company.	Location.	Capital Stock.	Par value.	Latest divs.	Prices. Opening.	Closing.
		Francs.	Fr.	Fr.	Fr.	Fr.
Anzin, Coal	France	.....	.....	200.00	5,505.00	5,525.00
Boleo, c	Lower Cal.	12,000,000	500	62.50	1,794.00	1,780.00
Champ d'Or, g	S. Africa	3,375,000	25	3.75	19.00	19.00
Courrieres, Coal	France	600,000	300	110.00	2,755.00	2,705.00
Fraser River, g	Brit. Col.	250,000	25	.....	5.50	5.50
Huanchaca, s	Bolivia	40,000,000	125	5.00	74.25	72.00
Laurium, z. l	Greece	16,300,000	500	25.00	338.00	328.00
Malfidano, z	Italy	12,500,000	500	50.00	592.00	580.00
Metaux, Cie. Fran. de	France	25,000,000	500	22.50	484.00	480.00
Mokta-el-Hadid, i. l	Algeria	18,312,000	500	40.00	839.00	845.00
Nickel, n	N. Caledonia	15,000,000	250	22.50	512.00	505.00
Penarroya, Coal	Spain	.....	500	45.00	1,144.00	1,130.00
Vielle Montagne z	Belgium	9,000,000	30	30.00	685.00	680.00
Wyoming, o	California	.....	25	.....	331.00	332.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. o—Oil. s—Silver. z—Zinc.

ST. LOUIS, MO.* Feb. 6

Name.	Par Val.	Prices. Bid.	Ask.
Am.-Nettie, Colo	$10	$0.25	$0.50
Catherine Lead, Mo.	10	.90	1.50
Central Coal & C	100	58.00	59.00
Central C. & C., pf.	100	69.50	71.00
Central Lead, Mo.	100	110.00	115.00

Name.	Par Val.	Prices. Bid.	Ask.
Columbia Lead, Mo.	$10	$3.50	$4.00
Con. Coal, Ill.	100	18.00	21.00
Doe Run Lead Mo.	100	110.00	115.00
Granite Bimet. Mt.	10	.42	.45
St. Joe Lead, Mo.	10	15.50	17.00

*By our Special Correspondent.